Automated Batting Cages

PT-4
OPERATION AND TECHNICAL MANUAL

Automated Batting Cages
8811 Huff Avenue N.E.
Salem, OR 97303

(800)578-2243
battingcages.com

FOREWORD

IMPORTANT!

This Operation and Technical Manual ***provides the owners and maintenance personnel with information covering Safety Procedures, Maintenance Procedures, Operational Procedures and Repair and Servicing of the Batting Cage equipment provided by Automated Batting Cages Corp. Read this document carefully. This equipment system contains several moving parts and has high voltage present which pose potential hazards to maintenance and operational staff. Pitching baseball/softballs to batting range customers also poses inherent risks to the batters. It is essential for operating a safe batting range operation that the owner/operator have a complete understanding of this manual. This manual must be used in conjunction with ABC training video tape to train employees in the safe operation and servicing of the ABC batting range equipment system and to minimize potential risks to the batting range customers.***

ABC will update this manual from time to time. These updates and notices will be mailed to the address that ABC has on record as your shipping address. Add these updates and notices to your manual. Should any of these pages be lost or damaged, call ABC and the pages will be replaced.

Please observe the following:

1). Keep this manual in the Maintenance Shop or Office during all working hours.

2). Maintenance Personnel must review this manual before servicing any equipment. Personal injury could result if maintenance personnel have not reviewed this manual.

3). All employees must review the "Standards for Batting Range Safety and Operation" of this manual and the ABC training video tape.

4). When new procedures, standards, additions or other changes are made to this manual, add them immediately to the manual.

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Limited Warranty

Warranty applies to original purchaser of the equipment and all products or accessories purchased from Automated Batting Cages, Corp. (ABC) unless specifically excluded. This warranty is not transferable and proof of original purchase may be required. Warranty begins on date of equipment installation. Products must be used in accordance with manufacturer's specifications, servicing specifications and operational standards.

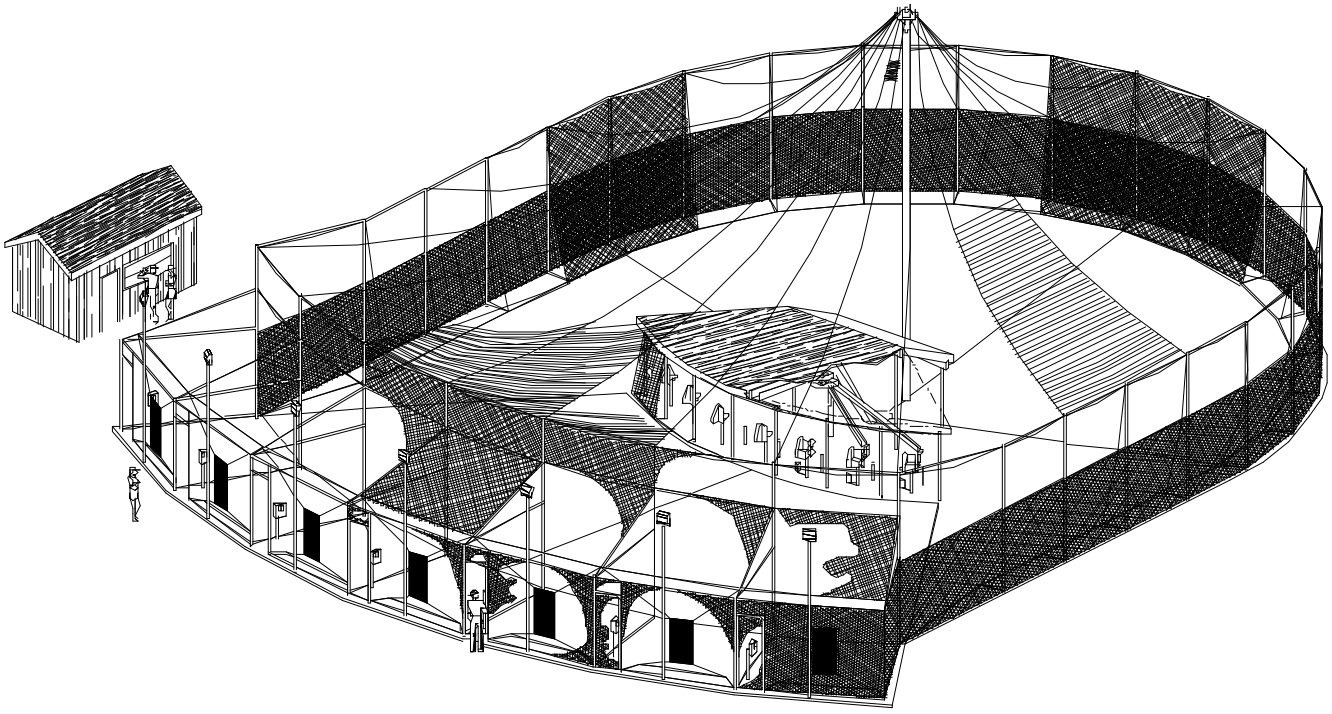
"ABC" warrants original equipment purchased with new systems for a period of one year from the original date of installation. "ABC" will repair or replace, at their option, any product, accessory or part that is proven to be defective in materials or workmanship under normal use during the warranty period. Anything that is replaced under warranty becomes the property of "ABC". All parts replaced under warranty are considered part of the original product and warranty shall expire concurrently with the warranty of the original purchase. **ABC offers a 90 day warranty period on all equipment, parts and accessories purchased after the initial one year warranty on new systems has expired.**

To obtain warranty, purchaser must return **at their expense** the defective part or product to "ABC". Items under warranty will be repaired or replaced by "ABC" without any charge for parts. Warranted items will be shipped or returned free of shipping charges to customer via **UPS GROUND**. Expedited shipping methods are available at purchaser's expense. Labor to replace defective parts, products and systems are excluded from this warranty and are the responsibility of the purchaser.

This warranty does not extend to products, accessories, or parts that are affected by misuse, poor maintenance, acts of nature, normal wear, neglect, improper installation, uses in applications not designed or intended, unauthorized alterations, or any other cause other than defects in materials and workmanship of the product. **Warranty does not include aluminum baseball or softball bats resold by "ABC" to purchaser.**

In no event will "ABC" be responsible for consequential damages and limitation of implied warranties. "ABC" disclaims any responsibility for loss of time or use of the products, commercial loss, transportation, or any other incidental damage. Any implied warranties are limited to the duration of this warranty.

ABC STANDARDS FOR BATTING RANGE SAFETY & OPERATION



Automated Batting Cages
8811 Huff Ave NE. Salem, Oregon, 97303
Phone: (503)390-5714, Fax: (503)390-4974
Toll Free: 1-800-578-2243

DESIGN STANDARDS

THESE BATTING RANGE DESIGN STANDARDS APPLY TO ALL OPERATORS/OWNERS OF ABC COMMERCIAL BATTING RANGES. THESE DESIGN STANDARDS PROMOTE AND ADVANCE SAFE BATTING RANGE OPERATIONS. THESE STANDARDS SHOULD BE UNDERSTOOD AND FOLLOWED BY ALL OPERATORS/OWNERS OF COMMERCIAL BATTING RANGES. ABC IS NOT RESPONSIBLE FOR THE COMPLIANCE OF THESE DESIGN STANDARDS OR THE CONSEQUENCES OF NON-COMPLIANCE.

1. All batting areas (batting stalls) must be well defined and have marked areas where the batter must stand.

2. All batting areas (batting stalls) must have a well defined and marked area where the balls will be generally thrown. Batters boxes and home plates must be painted in batting area. Batting stalls must be a hard surface, recommended materials include concrete, asphalt or wood.

3. All batting areas (batting stalls) must have a well defined and marked areas where batters are excluded.

5. Sloping floors, to allow for balls to roll out of batting area, should be used in all batting range operations.

6. Batting stalls must have adequate width to protect all batters and allow for batters swing width.

7. Batting stalls must have adequate depth to provide protection for batters and adjacent batters.

8. All batting stalls must have adequate lighting to provide complete visibility of pitched balls from pitching machine to home plate.

9. All pitching systems must employ Warning Light(s) or other visible methods to signal the batters that the pitching mechanism is ON and is capable of pitching a ball at any time.

10. Spectators must be adequately protected from contact with balls by netting and fencing systems. Balls should never be able to escape the batting cage area.

11. Equipment system must provide for stop and starting operation while operating continually ("rental play").

12. All batting stall gates must employ self-closing mechanisms to prevent balls from exiting the batting stalls.

13. All batting stalls which operate "dual-pitching mechanisms" (both baseball and softball pitching mechanisms) must be adequately marked to inform batters of dual-use mechanisms.

14) All batting stalls must have protective padding on front of the vertical pipes to cushion the balls from ricocheting back towards the batters.

OPERATIONAL SAFETY STANDARDS

THESE OPERATIONAL SAFETY STANDARDS APPLY TO ALL OPERATORS/OWNERS OF AN ABC COMMERCIAL BASEBALL AND SOFTBALL BATTING RANGE. THEY ARE INTENDED TO INFORM THE OPERATORS/OWNERS OF THE DANGERS AND RISKS ASSOCIATED IN THE OPERATION OF THE BATTING RANGE AND TO PROMOTE THE SAFE OPERATION OF THE BATTING CAGES. ALL STANDARDS SHOULD BE UNDERSTOOD AND FOLLOWED TO FACILITATE SAFETY IN THE BATTING CAGES. ABC IS NOT RESPONSIBLE FOR THE COMPLIANCE OF THESE SAFETY STANDARDS OR THE CONSEQUENCES OF NON-COMPLIANCE.

1 All batting stalls must adequately display a sign indicating how to operate the batting cage system. This sign must include the following information: How to start the game, When balls will be pitched, And when the game is over.

2 All batting range operations must adequately display a sign indicating that pitching machines will throw both balls and strikes.

3 All batting range operations must adequately display "Warning/Rules" sign's which include the following warnings and rules:

*Batters MUST wear helmets with face mask protection at all times.

*If machines are pitching out of the strike zone immediately alert the attendant.

*Only one person in the batting cages at a time during play. No coaches allowed in cage during game play.

*No switch hitting during game.

*Batters must wear shoes. (No Baseball-Softball Cleats)

*No person under the influence of Drugs or Alcohol is permitted to use the batting cages.

*Report all accidents immediately.

*These pitching machines throw both balls and strikes. Players should "Be Alert" at all times.

*Do not stand on home plate.

*Watch for balls rolling under feet.

*No one under the age of 6 years old is permitted to use the batting cages.

*No one under the age of 16 is allowed to use cages throwing the effective speed of 70 - 75 Mph.

*An adult must accompany all batting cage players under the age of 10.

*Close gates at all times when entering or exiting the cages.

*No practice swings outside of cages unless in designated areas.

*During or after the game, do not pick up balls from ground. Do not throw balls back at pitching machines.

*CAUTION! Injuries could result from the use of this device. Users should assume the inherent risks of batting baseballs and softballs. If users have any questions about the use of this device or the inherent risks associated with the use of this device, ask the attendant before using the batting cages.

OPERATIONAL SAFETY STANDARDS

4. In addition to posting "Warning/Rules" signs, Operators/Owners of commercial batting ranges must comply with the following operational safety standards:

*At least one trained attendant must be present at all times at the batting range to supervise the safe operation of the batting range. Attendant must have reviewed and understood this manual and ABC training video tape.

*At least one trained attendant must be present at all times to supervise and/or conduct the maintenance program of the batting range equipment/netting system. Attendant must have reviewed and understood this manual before performing any maintenance or servicing.

*At least one attendant must be present at all times trained in the "Safety Rules" of the batting range. Attendant must have reviewed and understood this manual and ABC training tape.

*Operator/Owner of the batting range must keep batting range equipment system maintained at all times to ABC's specifications. This manual details ABC's specifications. It must be reviewed and understood in order to maintain the ABC batting range equipment system. Keep this manual at the batting operation at all times for review. Refer to sections titled "MAINTNENACE" and "SERVICING" for specifications.

*ABC maintenance and operational forms must be completed by owner/attendant and stored for later review to confirm that maintenance and operational procedures have been followed. Refer to section titled "FORMS".

*Attendant must check ball pitching accuracy of all pitching machines at least once per day. If the accuracy has degraded, refer to the "TROUBLE SHOOTING GUIDE" section for proper adjustments.

*Operator/Owner must check daily, the condition of the balls. All balls showing signs of excessive wear, deformation, cracks, breakage or when the dimples on the balls are less than 50% of there original depth. If any of these conditions exist, remove balls from the batting range system immediately. Replace system with new balls. **New balls cannot be mixed with old balls!**

*Operator/Owner must train all attendants in the safe operation of the batting range and insist that all attendants maintain and promote a safe operation at all times. Training must include reviewing of this manual and ABC training video tape.

*Attendants or anyone inside of batting range must wear protective helmet with face guard at all times.

*Servicing of equipment system must be completed by a trained and qualified person having reviewed and understood this manual and ABC training video tape.

5. Follow all other manufacturers' operation and warnings when operating **Center Pole Winch**. All operators of **Center Pole Winch** must review and understand all operating and safety instructions.

6. Owner/Operator should establish and implement a Safety Program similar to the program detailed in the following "SAFETY PROGRAM FOR THE BATTING CAGES"

7. Balls remaining in hitting stalls must be **"Cleared"** by attendant before customer enters cage.

(*ALSO REFER TO SECTION TITLED "MAINTENANCE" FOR REGULARLY SCHEDULED MAINTENACE and OPERATIONAL PROCEDURES).

SAFETY PROGRAM FOR THE BATTING CAGES

THE FOREGOING IS A SAMPLE "SAFETY PROGRAM" FOR A COMMERCIAL BATTING RANGE. PLEASE KEEP IN MIND THAT A SAFETY PROGRAM MAY INCLUDE OTHER ELEMENTS THAN THOSE DETAILED HERE. ALL BATTING RANGE OPERATIONS SHOULD HAVE A MANAGEMENT-SPONSORED COMPREHENSIVE "SAFETY PROGRAM".

MANAGEMENT

It is essential that the management of the batting cage support the development and implementation of an effective safety program. It is the responsibility of the management to commit to a safety program and to communicate this commitment to all of management's employees. The Safety Program must include employee safety as well as guest safety and methods to carry out the program.

EMPLOYEE SAFETY

The safety of the employee must be the first priority of any safety program. Employee safety is mandated by agencies including federal, state and local municipalities. Be certain that the employees understand the risks that they are exposed to and how they can avoid these risks. Just as management must commit to the safety program, employees must also be willing to accept their responsibility to the program.

EMPLOYEE SAFETY EXPOSURE

1. Hit by pitched ball
2. Hit by batted ball
3. Hit with bat outside of batting cage
4. Injury from contact with mechanical parts (i.e. wheels, belts, motors, electrical components, etc...)
5. Hit by ball in the "pit area"
6. Injuries while batting or giving instruction
7. Slip on floor
8. Fire or robbery
9. Horse play
10. Operating Center Pole Winch (raising and lowering netting)

EMPLOYEE RISK REDUCTION

1. Thoroughly train staff regarding all Safety/Warning policies (Warning Signs, etc)
2. Wear Batting Helmets with Face Guards at all times while in hitting area, including "pit area"
3. Sound a warning to batters (whistle, yell, etc...) when going to "pit area"
4. Use safety netting in pit to block holes in netting while working in area
5. Thoroughly train all staff on operation of all pitching machines and batting range equipment systems. Have all staff review maintenance procedures with ABC Owner/Operator Manual

a. Train at initial hire

b. Re-train annually using ABC Operational and Technical Manual and ABC training video tape.

6. Thoroughly train staff of all Operating Standards relating to safety and operations
7. Turn off and unplug all electrical components when servicing equipment
8. Give instructions from outside of cages-Do Not enter cage when player is batting
9. Stop machines from pitching immediately when accidents occur or when rule enforcement is necessary
10. Do not use batting cage after accident has occurred until all equipment has been checked for proper operation

11. Train staff for all emergency policies
    a. Police telephone number
    b. Fire telephone number
    c. Ambulance telephone number
12. All staff must have a "NO TOLERANCE RULE" for breaking any Safety Rules or Procedures

GUEST SAFETY

Guest safety is essential to the batting range success. All guest safety programs must begin with the Employee safety program. Employees must be committed to this vital aspect of the business. The employees will be the most responsible for any Guest Safety Program implemented by Management.

GUEST SAFETY EXPOSURE

1. Hit by pitched ball
2. Hit by batted ball
3. Hit by bat outside of cages
4. Player too young or inexperienced to use a batting cage
5. Batters not standing in Batters Box
6. Non-Contact injuries while batting (i.e. ankle, knee, etc...)
7. Players/Guest not complying with all posted Rules
8. Food poisoning
9. Fire
10. Slip and fall
11. Horseplay

GUEST RISK REDUCTION

1. List and display <u>all</u> SAFETY/WARNING SIGNS and RULES for quest to follow (see "Operation Safety Standards")
2. Have all employees understand these SAFETY/WARNING SIGNS and RULES and ENFORCE THESE RULES! (see "Operational Safety Standards")
3. At least ONE batting range EMPLOYEE MUST BE ON DUTY AT ALL TIMES DURING CAGE OPERATION!
4. Pitching Machines, Warning Lights and related Feeding Systems must be adjusted and maintained at all times and must be in good working order at all times while batting cage is available for play.
5. Signs must be posted stating type of cage (baseball or softball) and speeds of pitch in each cage
6. Regular cleaning of floor/concrete to prevent slipping and to keep balls clean
7. All netting and protective fencing must be repaired, maintained and replaced when necessary
8. Inspect, clean and replace worn balls regularly
9. Follow all local health and safety codes
10. Employee must stop balls from pitching immediately when any accident occurs. Attend to guest immediately (refer to Management's Emergency Procedures). Do not allow batting in the batting cage where accident occurred until all equipment has been checked for proper operating condition. File Incident Report.

11. Completely train and re-train all employees about safety risks of your guests and themselves!
12. INSIST THAT EMPLOYEES HAVE ALL GUESTS FOLLOW THE POSTED RULES! EMPLOYEES MUST HAVE A **"ZERO TOLERANCE RULE"** FOR GUEST BREAKING POSTED RULES!
13. **EMPLOYEES MUST TAKE IMMEDIATE STEPS (stop pitching machines and remove batter from cage) TO MINIMIZE SAFETY RISKS TO GUEST WHEN RISK ARE APPARENT!**

FIRE PROTECTION

Fire protection should always be a part of Management's Safety Program. Consult with local fire authorities about their requirements. Be certain that employees have knowledge about the fire protection available at the batting cage.

FIRST AID

Management should have four basic areas of responsibility for First Aid.

1. Employee First Aid - Check with local agencies about First Aid Kits and your responsibility for Employee First Aid
2. First Aid to guests.
   a. Emergency First Aid - Have Emergency plan documented for employees to follow
   b. Courtesy First Aid - Have Band-Aids, ice, etc...)
3. Record Keeping and Reporting - It is essential that all First Aid (either employee or guest related) be documented and maintained for future reference
4. Injury Claims defense - Providing first aid and documenting the type and extent of all injuries and how the injury occurred is necessary for any Injury Claim Defense

INSPECTION

A Safety Program should address the need for inspections. These inspections should be focused in at least four areas:

1. Inspection of employees work area
2. Inspections to insure guest safety–see Regularly scheduled Maintenance and Operational Procedures in "Maintenance" section.
3. Inspections for housekeeping and fire protection
4. Required inspections for Federal, State and Local Requirements.

ACCIDENT INVESTIGATION

In order to reduce accidents from occurring, a preventive program must be in place. Recognizing potential risks and taking the appropriate steps to minimize or eliminate these risks is critical. All accidents must be investigated and documented, even if injuries have not resulted from the accident. Communicating these accidents should be a regular occurrence within the Safety Program.

SAFETY TRAINING

Safety training should not be confused with Job Training. Safety training should be conducted singularly

(continued next page)

and considered a separate responsibility of the employee. Safety Training should be conducted when the employee is first hired and should be reviewed at least once a year.

RECORD KEEPING

Record Keeping for the Safety Program should include several records including; Employee Injury Reports, Guest Injury Reports, Inspection/Maintenance Reports, documented Safety Program Training and reviews and "Accident Investigation" meetings. (Refer to section "Daily Operational Forms & Checklists").

BATTING RANGE EQUIPMENT MAINTENANCE

Equipment maintenance should only be performed by qualified persons with a full understanding of the equipment and how it operates. It is also very important that the person maintaining the equipment understands about the batting range operation and risks involved with repairing and maintaining the system. All daily, weekly, monthly and other periodic maintenance should be conducted on the pitching machine equipment and the related equipment. Refer to the section titles "MAINTENANCE" in the "ABC Owner/ Operators Manual" for specific maintenance and operational procedures. Document all maintenance and operational procedures and file for future reference.

COMMUNICATIONS

The Safety Program must be communicated clearly and understood by every person involved in it's implementation. Communication techniques should include written material along with on-site instructions and directions. All training sessions should be documented and filed for future reference.

HOUSEKEEPING

Safety Program should include a Housekeeping element and all staff should understand the necessity of cleanliness.

EMERGENCY PROCEDURES

Management must detail Emergency Procedures which would be followed in the event of any emergency. These emergencies will include NATURAL DISASTERS (wind, rain, earthquake, etc...), ACCIDENTS (injuries) and MAN-MADE DISASTERS (bomb threats, structural, power outages, etc...).

September 8, 1992

Dear Range Owner,

We wanted to write and share some safety features that we have added to our Batting Ranges. Please read this material and incorporate the changes.

The illustration below (figure 1.0) is an overview of a typical batting stall and batters box. Please note the 7'-6" dimension from the opening of the stall to the center of Home plate. This dimension will ensure the "Batters Box" is adequately back far enough from the opening of the stall and reduce the risk of "fouled balls" striking another batter. If your Batters Box is not at least 7'-6" as shown, you will need to move your boxes back.

Also note that we suggest you paint a red "**DO NOT PASS RED LINE**" line as shown on this drawing. The purpose of this line is to keep customers from going forward of this line. We clearly do not want customers out in "open" area, in the "pit", or batting in an area which will cause the flight of the ball to enter another stall.

Please implement these changes or additions for the stalls immediately. If you have any questions please call ABC.

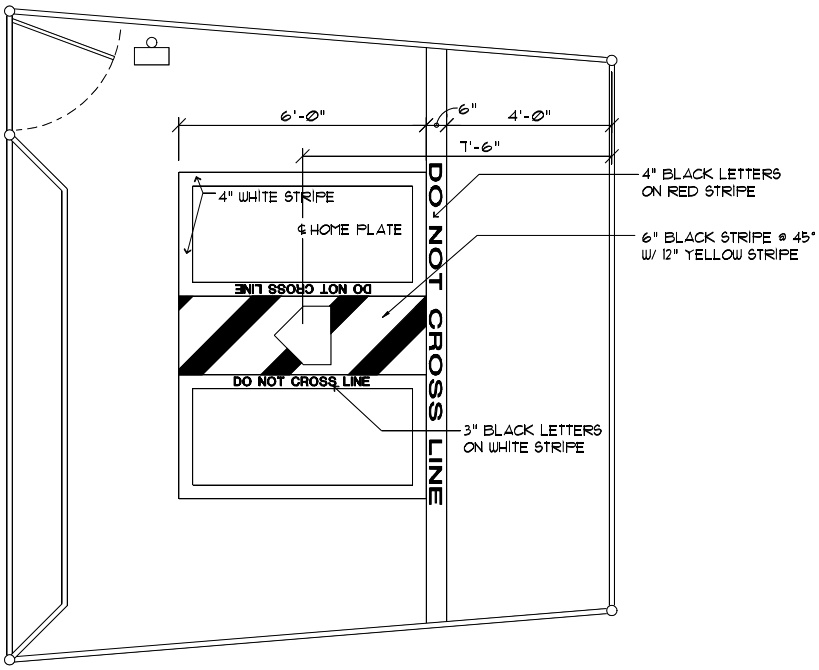


figure 1.0

Batter's Box Layout

IMPORTANT INFORMATION

WINCH & CENTER POLE COLLAR STOPS

IN ALL CASES, THE CENTER POLE WINCH AND COLLAR ASSEMBLY MUST ONLY BE USED WITH "CENTER POLE COLLAR STOPS" WELDED IN PLACE ON THE CENTER POLE. THESE STOPS SHOULD HAVE BEEN WELDED ONTO THE CENTER POLE AT THE INITIAL CONSTRUCTION PHASE. THEY WERE (AND ARE) ILLUSTRATED ON THE ORIGINAL "ABC" CONSTRUCTION BLUE PRINTS AND ILLUSTRATED IN THE ENCLOSED DRAWING. "ABC" WILL PROVIDE THESE COLLAR STOPS AT NO CHARGE. THESE STOPS WORK AS AN EMERGENCY COLLAR STOP. WINCHES SHOULD NEVER BE USED WITHOUT THESE COLLAR STOPS! IF THESE STOPS ARE NOT IN PLACE, DO NOT OPERATE THE WINCH.

NOTICE!

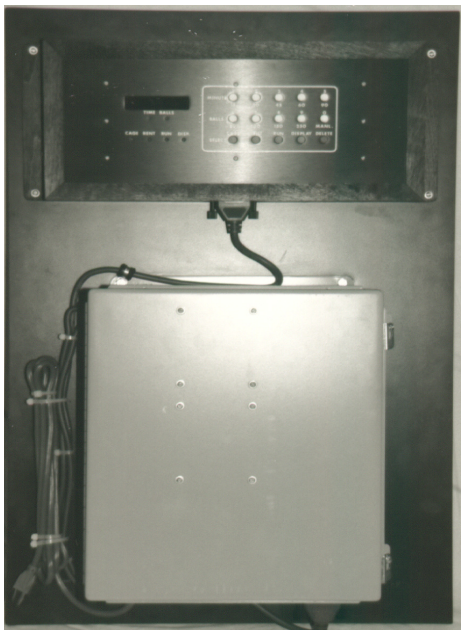
"ABC" HAS BEEN OFFERING TO SELL CENTER POLE WINCHES AND CABLES THAT WE BELIEVE ARE OF SUFFICIENT QUALITY AND OF SUFFICIENT LIFTING CAPABILITY. HOWEVER, FAILURES CAN OCCUR WHICH MAY RESULT IN THE COLLAR FALLING UNCONTROLLABLY. WITHOUT CENTER POLE STOPS, SERIOUS INJURIES MAY RESULT!

IF YOU HAVE ANY QUESTIONS REGARDING THE USE, SAFETY AND OPERATION OF THESE WINCHES OR CABLES, CONTACT YOUR LOCAL OSHA INSPECTOR AND/OR LOCAL ENGINEER TO SATISFY YOUR CONCERNS. REFER TO PAGES 115-137 FOR DRAWINGS, CONNECTIONS DETAILS AND LOAD RATINGS.

BATTING CAGE PROCESSOR
AND
DISPLAY PANEL
OPERATION MANUAL

(Pages 13 thru 20)

THE WARRANTY ON THIS PRODUCT IS NOT VALID UNTIL
THIS OPERATION MANUAL HAS BEEN READ



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PROCESSOR FEATURES

The Batting Cage Controller is a solid state microcomputer device designed to control one to ten Batting Cages. Specifically, the Batting Cage Controller is designed to:

1) Provide a control and auditing system which cannot be circumvented or altered by employees.
2) Permit programmable control of the number of balls to be pitched.
3) Permit programmable control of the number of coins required to start a game.
4) Provide individual user rental time consisting of 15, 30, 45, 60, or 90 minutes or various ball quantities.
5) Allow monitoring of the time remaining or the number of balls left to be pitched in any cage at any time.
6) Allow auditing of the "RENT", "DELETE" and "MANUAL" switches to determine the number of times each switch has been pressed.
7) Allow auditing of the number of coins collected in each cage.

PROGRAMMING 8 OR 10 CAGE OPERATION

(NOTE: This programming requires the new 102C and 103C card.)
If you have any other version than the "C" cards please refer to page 58 for 101 Card Usage Instructions.

1. Set **"PROGRAM"** switch to **"ON"**.
2. Press **"RUN"** to display cage select.
3. Press **"8"** to select 8 cage program or **"0"** for 10 cage program.
4. Set **"PROGRAM"** switch to **"OFF"** and you are finished.

10108 Will be displayed for 8 cage program.

10110 Will be displayed for 10 cage program.

WIRING INSTRUCTIONS

A. Wiring of Pitching Motors

1) Using a 3-conductor shielded cable, the ball counter microswitches are connected to the appropriate inputs in the control box. (See Appendix A for a complete wire list.) The common of the microswitch is connected to the common line. Shield of cable must not be connected to case ground at machine, but must be connected to common or ground at the control box.
2) The outputs in the control box are connected to the "A" or "B" inputs of the light box controller.
3) The common of the cable MUST NOT be grounded at the machine, but at the common of the control box.

NOTE: COMMON IS NOT GROUND EXCEPT IN THE CONTROL BOX

B. Wiring of the Coin Mechanism

1) Using a 2-conductor shielded cable, the normally open contacts of the microswitches on the coin mechanisms are connected to the coin inputs of the control box. (See Appendix A for a complete wire list.) The common of the microswitch is connected to the common line.

PROGRAMMING BALL AND COIN COUNTS

The Batting Cage Controller is designed so that changes can easily be made in either the ball count or the coin count, or in both of these counts if desired. To change the ball or coin count follow these steps:

1) Flip "PROGRAM" switch in the control box to "ON".
2) Press "RENT" to display existing ball count, or "CAGE" to display existing coin count.
3) If desired count is less than the existing count, press switch #4 to clear counter. Then press switches 1, 2, and 3 in the proper order as described below. (see note)

4) If desired count is greater than existing count, use switches 1, 2, and 3 as described below (see note)
6) When finished, flip "PROGRAM" switch to "OFF".

NOTE: Switches 1, 2, 3, and 4 are used to change the ball and coin counts stored in the memory of the controller.

1) Switch #1 increases the count by one.
2) Switch #2 increases the count by five.
3) Switch #3 increases the count by ten.
4) Switch #4 clears the counter completely.

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(Continued from page 15)

The maximum ball or coin count is 255. Ant attempt to program the count to exceed this maximum will cause the counter to clear completely.

Although the "RENTAL TIME" and "RENTAL BALLS" cannot be changed with the above method, the Phenix Company can change these amounts if desired and provide a new front panel.

OPERATING INSTRUCTIONS

After the ball and coin counts have been programmed, you're ready to operate.

1) Press the "RUN" switch. This puts the panel in the normal run mode.
2) Press the "CAGE" switch, followed by the switch for the cage you wish to operate. (cage numbers are above switches.)
3) Press the "RENT" switch, followed by the switch for the amount of time or number of balls desired. (Numbers below switches).

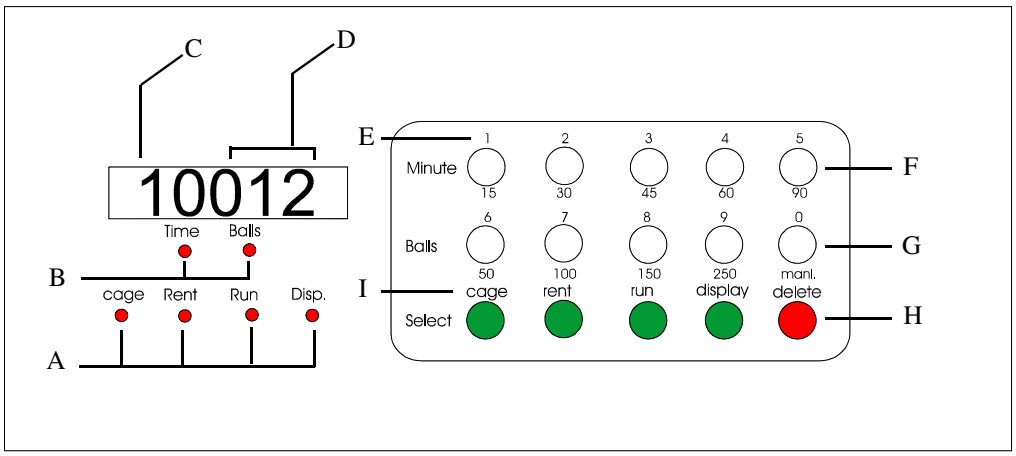
The machine will now operate. Should you want to stop the operation of any machine, just press the switch for that particular cage, followed by the "DELETE" switch.

OPERATION OF MANUAL SWITCH

The "MANL" switch can turn on any batting cage. To operate a batting cage of your choice, follow these steps:

1) Press the switch for the cage you want to operate.
2) Press the "RENT" switch, then "MANL".

The quantity displayed on the counter will decrease as each ball is pitched, and the machine will stop pitching after the set number of balls. You may also stop the machine by pressing the "DELETE" switch.



A = Mode Indicators
B = Display Indicators
C = Cage
D = Balls or Time
E = Cage Number
F = Time Rent Switches
G = Ball Rent Switches
H = Delete Switch
I = Mode Switches

(Continued on page 17)

(Continued from page 16)

TO DISPLAY AMOUNTS IN COUNTERS

The Batting Cage Controller is designed to allow you to audit the following functions.

1) The number of coins collected in each cage.
2) The number of times each quantity of rental time or balls has been activated.
3) The number of times the "DELETE" and "MANUAL" switches have been pressed.

In order to audit the functions described above, follow these steps:

A. To Display Individual Cage Operations

1) Press "DISPLAY". This puts the panel in the display mode.
2) To audit the number of coins collected in a particular cage, press "CAGE", followed by the switch for the cage you want to check.
3) To audit the number of rentals, press "RENT", followed by the switch for the amount of rental time or balls you want to check.

EXAMPLE: 10009

In the amount displayed above, the 1 represents the number of the cage being audited. The 9 represents the number of coins collected in cage number 1.

4) Press "RUN" to exit the display mode.

B. To Display Manual Switch Operations

1) Press "DISPLAY" switch, followed by "RENT", and then "MANL".
2) Press "RUN" to exit the display mode.

C. To Display Delete Switch Operations

1) Press "DISPLAY". This puts the panel in the display mode.
2) Press "DELETE".
3) Press "RUN" to exit the display mode.

AUDITING USAGE

The Batting Cage Controller is designed to allow you to audit the following functions:

1. The number of coins collected in each cage.
2. The number of times each quantity of rental time or balls has been activated
3. The number of times the "DELETE" switch has been pressed.
4. The number of times the "MANUAL" switch has been pressed.

In order to audit the functions described above, follow these steps:

1. COIN COUNT:

- Press "DISPLAY" button, this puts the panel in the display mode.
- To audit the number of coins collected in a particular cage, press the "CAGE" button, followed by the switch for the cage you want to check. EXAMPLE: To display the number of coins collected in cage #1.

  Press "DISPLAY"
  Press "CAGE"
  Press "1"
  Press "RUN" to exit the display mode.

2. RENT & BALL COUNTS:

- Press "RENT" button, followed by the switch for the amount of rental time or balls you want to check. EXAMPLE: To display the number of times the 45min switch has been pressed.

  Press "DISPLAY"
  Press "RENT"
  Press "45"
  Press "RUN" to exit the display mode.

3. DELETE COUNT:

- Press "DISPLAY" button, this puts the panel in the display mode.
- Press "DELETE".
- Press "RUN" to exit the display mode.

4. MANUAL COUNT:

- Press "DISPLAY" button, this puts the panel in the display mode.
- Press "MANUAL".
- Press "RUN" to exit the display mode.

8 CAGE SINGLE WIRING DIAGRAM			
D1	5vdc (To Diverter Board) Red Wire	E11	Gnd (To 4109 or 8409 Power Supply Block) Black Wire
D2	5vdc	E10	12vdc (To 4109 or 8409 Power Supply Block) Red Wire
D3	F4 5vdc (To 4109 or 8409) Yellow Wire	E9	D
D4	F3	F8	Output to Light Box (Cage 8) Red Wire
D5	F2	F7	Output to Light Box (Cage 7) Red Wire
D6	F1 5vdc (To Program Switch) Blue Wire	F6	Output to Light Box (Cage 6) Red Wire
D7	Q	F5	Output to Light Box (Cage 5) Red Wire
D8	Gnd (To Display Panel) Black Wire	F4	Output to Light Box (Cage 4) Red Wire
D9	Gnd (To Program Switch) Black Wire	F3	Output to Light Box (Cage 3) Red Wire
D10	Gnd	F2	Output to Light Box (Cage 2) Red Wire
D11	Gnd	F1	Output to Light Box (Cage 1) Red Wire
D12	Gnd	H1	5vdc (To Display Panel) White Wire
C8	5vdc Ball Count Microswitch (Cage 4) Black Wire	H2	5vdc (To Display Panel) Grey Wire
C7	5vdc Coin Mech. Microswitch (Cage 4) White Wire	H3	5vdc (To Display Panel) Purple Wire
C6	5vdc Ball Count Microswitch (Cage 3) Black Wire	H4	5vdc (To Display Panel) Blue Wire
C5	5vdc Coin Mech Microswitch (Cage 3) White Wire	H5	5vdc (To Display Panel) Green Wire
C4	5vdc Ball Count Microswitch (Cage 2) Black Wire	H6	5vdc (To Display Panel) Yellow Wire
C3	5vdc Coin Mech. Microswitch (Cage 2) White Wire	H7	5vdc (To Display Panel) Orange Wire
C2	5vdc Ball Count Microswitch (Cage 1) Black Wire	H8	5vdc (To Display Panel) Brown Wire
C1	5vdc Coin Mech. Microswitch (Cage 1) White Wire	J9	Gnd (To Display Panel) Black Wire
B1	5vdc Coin Mech. Microswitch (Cage 5) White Wire	J10	Gnd
B2	5vdc Ball Count Microswitch (Cage 5) Black Wire	J11	Gnd
B3	5vdc Coin Mech. Microswitch (Cage 6) White Wire	J12	Gnd
B4	5vdc Ball Count Microswitch (Cage 6) Black Wire	J13	Gnd
B5	5vdc Coin Mech. Microswitch (Cage 7) White Wire	J14	5vdc
B6	5vdc Ball Count Microswitch (Cage 7) Black Wire	J15	5vdc
B7	5vdc Coin Mech. Microswitch (Cage 8) White Wire	J16	5vdc
B8	5vdc Ball Count Microswitch (Cage 8) Black Wire	J17	5vdc
A1	5vdc	K1	5vdc Cage 1 (In Run Mode) Gnd (In Rent Mode) Red Wire
A2	5vdc	K2	5vdc Cage 2 (In Run Mode) Gnd (In Rent Mode) Red Wire
A3	5vdc	K3	5vdc Cage 3 (In Run Mode) Gnd (In Rent Mode) Red Wire
A4	5vdc	K4	5vdc Cage 4 (In Run Mode) Gnd (In Rent Mode) Red Wire
A5	5vdc (To Display Panel) Yellow Wire	K5	5vdc Cage 5 (In Run Mode) Gnd (In Rent Mode) Red Wire
A6	5vdc (To Display Panel) Orange Wire	K6	5vdc Cage 6 (In Run Mode) Gnd (In Rent Mode) Red Wire
A7	5vdc (To Display Panel) Red Wire	K7	5vdc Cage 7 (In Run Mode) Gnd (In Rent Mode) Red Wire
A8	5vdc (To Display Panel) Brown Wire	K8	5vdc Cage 8 (In Run Mode) Gnd (In Rent Mode) Red Wire

10 CAGE SINGLE WIRING DIAGRAM			
D1	5vdc (To Diverter Board) Red Wire	E11	Gnd (To 4109 or 8409 Power Supply Block) Black Wire
D2	5vdc	E10	12vdc (To 4109 or 8409 Power Supply Block) Red Wire
D3	F4 5vdc (To 4109 or 8409) Yellow Wire	E9	D
D4	F3	F8	Output to Light Box (Cage 8) Red Wire
D5	F2	F7	Output to Light Box (Cage 7) Red Wire
D6	F1 5vdc (To Program Switch) Blue Wire	F6	Output to Light Box (Cage 6) Red Wire
D7	Q	F5	Output to Light Box (Cage 5) Red Wire
D8	Gnd (To Display Panel) Black Wire	F4	Output to Light Box (Cage 4) Red Wire
D9	Gnd (To Program Switch) Black Wire	F3	Output to Light Box (Cage 3) Red Wire
D10	Gnd	F2	Output to Light Box (Cage 2) Red Wire
D11	Gnd	F1	Output to Light Box (Cage 1) Red Wire
D12	Gnd	H1	5vdc (To Display Panel) White Wire
C8	5vdc Ball Count Microswitch (Cage 4) Black Wire	H2	5vdc (To Display Panel) Grey Wire
C7	5vdc Coin Mech. Microswitch (Cage 4) White Wire	H3	5vdc (To Display Panel) Purple Wire
C6	5vdc Ball Count Microswitch (Cage 3) Black Wire	H4	5vdc (To Display Panel) Blue Wire
C5	5vdc Coin Mech Microswitch (Cage 3) White Wire	H5	5vdc (To Display Panel) Green Wire
C4	5vdc Ball Count Microswitch (Cage 2) Black Wire	H6	5vdc (To Display Panel) Yellow Wire
C3	5vdc Coin Mech. Microswitch (Cage 2) White Wire	H7	5vdc (To Display Panel) Orange Wire
C2	5vdc Ball Count Microswitch (Cage 1) Black Wire	H8	5vdc (To Display Panel) Brown Wire
C1	5vdc Coin Mech. Microswitch (Cage 1) White Wire	J9	Gnd (To Display Panel) Black Wire
B1	5vdc Coin Mech. Microswitch (Cage 5) White Wire	J10	Gnd
B2	5vdc Ball Count Microswitch (Cage 5) Black Wire	J11	Gnd
B3	5vdc Coin Mech. Microswitch (Cage 6) White Wire	J12	Gnd
B4	5vdc Ball Count Microswitch (Cage 6) Black Wire	J13	Gnd
B5	5vdc Coin Mech. Microswitch (Cage 7) White Wire	J14	5vdc
B6	5vdc Ball Count Microswitch (Cage 7) Black Wire	J15	5vdc
B7	5vdc Coin Mech. Microswitch (Cage 8) White Wire	J16	5vdc
B8	5vdc Ball Count Microswitch (Cage 8) Black Wire	J17	5vdc
A1	5vdc Coin Mech. Microswitch (Cage 9) White Wire	K1	Gnd Cage 9 (In Run Mode) and (In Rent Mode) Red Wire
A2	5vdc Ball Count Microswitch (Cage 9) Black Wire	K2	Gnd Cage 10 (In Run Mode) and (In Rent Mode) Red Wire
A3	5vdc Coin Mech. Microswitch (Cage 10) White Wire	K3	Gnd (In Run Mode) and (In Rent Mode)
A4	5vdc Ball Count Microswitch (Cage 10) Black Wire	K4	Gnd (In Run Mode) and (In Rent Mode)
A5	5vdc (To Display Panel) Yellow Wire	K5	Gnd (In Run Mode) and (In Rent Mode)
A6	5vdc (To Display Panel) Orange Wire	K6	Gnd (In Run Mode) and (In Rent Mode)
A7	5vdc (To Display Panel) Red Wire	K7	Gnd (In Run Mode) and (In Rent Mode)
A8	5vdc (To Display Panel) Brown Wire	K8	Gnd (In Run Mode) and (In Rent Mode)

TROUBLE SHOOTING GUIDE FOR ABC'S BATTING RANGE SYSTEM

Pages 21 thru 34

TROUBLE SHOOTING GUIDE

CAUTION! EMPLOYEES SHOULD ALWAYS WEAR A BATTING HELMET WITH FACE GUARD AND SOUND A WARNING FOR BATTERS TO LEAVE BATTING STALLS DURING MAINTENANCE OF EQUIPMENT

THIS EQUIPMENT SYSTEM HAS SEVERAL MOVING PARTS AND HIGH VOLTAGE PRESENT WHICH POSE POTENTIAL DANGER TO ANY PERSON SERVICNG OR MAINTAINING IT. BEFORE SERVICING OR MAINTAINING EQUIPMENT SYSTEM, YOU MUST REVIEW "MAINTENANCE" SECTION OF THIS MANUAL. SERIOUS INJURIES COULD RESULT IF NOT REVIEWED, UNDERSTOOD AND FOLLOWED!

This introduction is an explanation of how ABC's Batting Range System works from the initiation of the game to the completion of the game.

A. MICROPROCESSOR

The microprocessor, or master control panel, is the brain of your batting range. The logic, or "thinking abilities" of the microprocessor will determine when the cages begin operation and the type of game to be played, (i.e. coin activated game, manually activated, or rental). The microprocessor has an adjustable program which enables the operator to set any coin and ball amounts he/she decides to use for the range. The display panel is the "keyboard" of the microprocessor. The operator can control the batting range with the display panel and also obtain totals of all games played in the batting range.

The microprocessor has three positions or modes of operation. These are 1) normal operating mode, 2) programming, and 3) display mode.

1) Normal operating mode - used when the microprocessor is in its normal operating state. (for example, ball counts and team rentals)
2) Programming mode - used for entering or changing your specific coins = number of balls.

3) Display mode - normally used at the end of the day when you are recording:

   a) The total amount of coins used in each cage.
   b) The number of and types of team rentals.
   c) The total amount of manual games issued.
   d) The total amount of deletes.

Please refer to the microprocessor owners manual for operating instructions.

B. COIN BOX

The coin box and coin mechanism are linked to the microprocessor via the Belden (low voltage) control cables. The coin mechanism provides an input to the microprocessor which then activates the corresponding light box and pitching machine. This is achieved through a very simple process. The coin mechanism has two wires attached to its microswitch, one wire carries a constant 5 volt DC signal, the other is ground. When the coin drops through the coin mechanism and deflects the wire whisker on the microswitch the 5 volt DC signal is lowered (or shorted). The microprocessor recognizes this as an "input" and begins the process of starting a game by sending a signal to the light box.

C. LIGHT BOX

The light box is the device which directs several functions of the batting cage; the pitching machine, the warning lights, the pinch roller and vibrator motor all receive their operating current from the light box and at the appropriate time. The light box is activated by a 5 volt DC signal sent from the microprocessor. The light box will operate as long as the 5 volt DC signal is present. The ball count microswitch (attached to the pitching machine ball chute) provides "inputs" (pitched balls) to the microprocessor using the same principle as the coin mechanism microswitch. When the programmed amount of pitched balls ("input") are received by the microprocessor, the 5 volt DC signal is discontinued and all functions of the cage stop (except for the pitching machine). The pitching machine will continue to run for approximately 8 - 10 minutes, but no balls will be pitched until a new game is activated at the coin box or manually at the display panel.

D. AUTOMATIC CONVEYOR SYSTEM

The Automatic conveyor system's function is to collect the balls, carry them up to the hopper level, sort the baseballs from the softballs and deliver them to the ball chutes. The conveyor drive motor rotates the top conveyor pulley, which drives the conveyor belt. Both the baseball and the softball hoppers have a "Chinese hat" that agitates the balls with its rotating action. Each Chinese hat is driven by an electric motor. After falling into the hoppers, the balls leave through the exit holes and roll down the ball chutes.

E. PITCHING MACHINE

The Pitching machine is the heart of the batting range. Maintenance, servicing, and operating instructions are described throughout the various sections of this manual. The principle behind the pitching of the ball is simply based on the RPM's of the wheels (or wheel) and the amount of "pinch" on the ball. The two wheels rotate in the opposite directions and at different RPM's to create the proper "backspin" on the ball. The velocity of the pitch is achieved when a ball is pinched between the wheels and is accelerated by the rotating wheels.

IMPORTANT TROUBLE SHOOTING INFORMATION

In order to effectively trouble shoot a problem in your batting range you must first determine where the problem is located. In most cases a problem will develop because of a component failure or a bad electrical connection. The first step, in all cases, will be to look at your master office control panel to see if the game has registered in that particular cage. If the game has registered, proceed to the Light Box Section of this guide. If it does not register on the display panel proceed to the Coin Box Section.

The sequence of a normal game is:

1) Game is activated either by coin or "manually" through the microprocessor.
2) The pitching machine and the yellow light of the light box are activated.
3) The red light and pinch roller begin to operate, balls begin to pitch.
4) After the programmed amount of balls have been thrown, all functions stop except the pitching machine. No balls will be thrown, but the pitching machine will continue to run for approximately 8 - 10 minutes on the "off delay" cycle.

It is very important to observe the sequence of this operation and to take note of what is not happening, or what is out of sequence. This will enable you to understand how the system works and direct you to the specific problem area. If any problems occur that are not listed in the manual please call the Service Department at ABC.

When trouble shooting "Dual Machine Systems" separate circuits are present for different functions. This would apply to the Coin box, Light box, and Pinch rollers. "A" circuit represents "front" or baseball system, "B" circuit represents "rear" or softball system.

HAVING TROUBLE WITH YOUR...

I. MICROPROCESSOR

What's the **PROBLEM**	*Is this the* **CAUSE**	*Here's the* **SOLUTION**
1) The digital readout on the display panel shows a "0" on the far right, or shows an irregular or unusual combination of numbers.	1) 102 microprocessor card has lost or scrambled memory.	1) Refer to "E-Prom" 101 card usage directions. If this does not work call ABC.
2) Microprocessor is plugged into power and no lights appear on the display panel.	2) Blown fuses	2) Inspect fuses inside gray microprocessor box. Replace with any size fuse up to 5amp.
3) Microprocessor is plugged into power, nothing is registered on the display panel, but one or more pitching machines are running.	3a) Defective 104 output card	3a) Replace 104 card.
	3b) 102 microprocessor card has scrambled program.	3b) Refer to "E-Prom" 101 card usage directions. If this does not work call ABC.

FOR DUAL MACHINE SYSTEMS

4) Game registers on display panel but does not begin operation.	4a) Bad connection between diverter processor block and diverter circuit board.	4a) Disconnect power from main processor. Carefully remove "diverter processor block" and re-install.
	4b) No 5VDC present at "7288" diverter board.	4b) Check for voltage 5VDC between red and black wire, located at top left section of diverter board. If voltage is not present, check connections between diverter board and processor mother board, replace wires as necessary.
	4c) Bad connection between diverter board and Processor mother board.	4c) Tighten all screws on the diverter board and processor mother board.
	4d) Defective diverter processor block.	4d) Replace "7283" diverter processor block.
	4e) Defective diverter processor block.	4e) Replace "7288" diverter circuit board.

II. COIN BOX

PROBLEM	CAUSE	SOLUTION
1) Customer inserts token into coin mechanism and it does not register on the display panel.	1a) Token in coin return	1a) Pull token out of coin return and try again.
	1b) Token stuck in coin mechanism.	1b) Open coin mech, by pinching the two tabs together and pulling. Mechanism will hinge out, then dislodge token.
	c) Wire whisker on coin mechanism microswitch needs adjustment.	1c) If coin is not registering, bend wire in manner to make it longer. If multiple counts are registering from one coin, bend the wire in manner to make it shorter.
	1d) Defective coin mechanism microswitch.	1d) Unplug the two wires connected to the microswitch and touch them together then release, if nothing registers on display panel call ABC.
	1e) Wire in coin box is bad.	1e) Inspect wire going to microswitch for nicks, cuts, or pinches. Repair as needed.

III. LIGHT BOX

To determine light box problems, activate the machine and see what is out of sequence. Also, make sure token has registered on display panel.

PROBLEM	CAUSE	SOLUTION
1) Token inserted in coin box, it registers on display panel, but system does not begin operation.	1a) No power at electrical outlet, which light box is plugged into.	1a) Check Circuit breaker at service panel.
	1b) No (5VDC) signal from microprocessor.	1b) Check for voltage (5VDC) inside light box. For "A" machine check between red and green of belden cable. For "B" machine check between white and green.
	1c) No power (115VAC) at light box terminal strip.	1c) Check for (115VAC) between black and white wires on "power" section of terminal strip. If no power is detected, check power cord.
	1d) No power at secondary side of transformer. (3 wire side).	1d) If there is 115VAC at primary side of transformer (2 wire side), but there is not 12VAC coming out of the secondary side (3 wire), replace transformer or call ABC.
2) Token inserted, registers on display panel, all components begin operation, except "yellow" light.	2a) Light bulb burned out.	2a) Replace light bulb.
	2b) Defective "yellow light" relay.	2b) Replace "7227" yellow light relay.
	2c) No triggering voltage to yellow light relay from "controller".	2c) Replace "7234 or 7995" controller.
	2d) Defective yellow light assembly.	2d) Replace yellow light assembly.
	2e) Bad ground on light assembly.	2e) Repair ground connections.
	2f) Poor connection in light box.	2f) Tighten all screws on circuit board. NOTE: "do not over tighten screws, they could break off".

TROUBLE SHOOTING GUIDE

PROBLEM	CAUSE	SOLUTION
3) Token inserted, registers on display panel, all components begin operation except pitching machine. For dual machine systems, remember to follow "solution" on appropriate circuit. NOTE: To isolate problem, unplug light box and plug directly into outlet. If pitching machine does not run, proceed to problem 1 in pitching machine section. If machine does operate, proceed in this section.	3a) Loose wire on machine pigtail cord coming from light box.	3a) Remove female end of plug and check for loose wires.
	3b) Defective MACH "A"/ MACH "B" relay.	3b) Replace "7227" pitch relay inside light box.
	3c) Defective MACH "A"/ MACH "B" mercury displacement relay.	3c) This relay can be checked with a voltmeter. If no voltmeter is available, replace relay or call ABC.
	3d) Bad connection in pitching machine circuit.	3d) Check connections of all wiring from "power in", to "mercury displacement relay", and back to "pitch" section on the terminal strip inside the light box.
	3e) Defective "7234" or "7995" controller block.	3e) Replace "7234" or "7995" controller block in the light box.
4) Token inserted, registers on display panel, all components begin operation except red light. NOTE: Pinch Roller will not operate if red light is not functioning. This is a fail-safe condition built into the system.	4a) Red light bulb burned out or broken.	4a) Replace "red light" bulb.
	4b) Defective "red light" relay.	4b) Replace "7227" red light relay inside the light box.
	4c) Poor connection in light box.	4c) Tighten all screws on circuit board. **NOTE: DO NOT OVER TIGHTEN SCREWS, THEY WILL BREAK OFF.**
	4d) Bad "fail safe" relay.	4d) Replace "7225" fail-safe relay inside the light box.
	4e) No triggering voltage to red light relay from controller.	4e) Replace "7234" or "7995" controller relay.
	4f) Bad ground on light assembly.	4f) Repair ground connections.
5) Token inserted, registers on display panel, all components begin operation except pinch roller. For dual machine system, remember to follow "solution" on appropriate circuit.	5a) Pinch roller set screw is loose on pinch roller motor shaft.	5a) tighten pinch roller set screw on pinch roller wheel. Set screw must tighten against the flat spot on the Pinch roller motor shaft.
	5b) Bad or loose connection on power cord, going from "Light box" to "Pinch roller motor".	5b) check wires for loose connection. Trace from light box to pinch roller motor.
	5c) Defective "feeder" relay.	5c) When both lights come on, check for 115VAC at pinch roller connection, with wires connected to motor. If no power (115VAC) is present, replace "7227" Feed "A"/ Feed "B" relay.

PROBLEM	CAUSE	SOLUTION
(problem 5 continued)	5d) Defective pinch roller motor.	5d) Duplicate test in solution "C". If power is present replace pinch roller motor.
	5e) Defective "fail-safe relay".	5e) Replace "7225" fail-safe relay.
6) Pinch roller begins operating when light box is plugged into outlet. No lights are on.	6) Defective "feeder relay".	6) Replace "7227" Feed "A"/ Feed "B" relay inside the light box.
7) Red light and pinch roller both come on as soon as token is inserted, (no delay between yellow).	7a) Defective "red light relay".	7a) Replace "7227" red light relay inside the light box.
	7b) Bad controller.	7b) Replace "7234" or "7995" controller relay inside the light box.
8) Game has ended, lights go out, pinch roller stops, but pitching machine continues to run after the 10 minute "off delay".	8a) Bad "controller".	8a) Replace "7234" or "7995" controller inside the light box. To verify, unplug light box, wait 5 - 10 seconds and plug back in. If machine does not run, "7234" or "7995" controller is defective.
	8b) Defective "machine" relay	8b) Replace "7227" MACH "A"/ MACH "B" relay.
9) Token inserted and both lights come on at the same time.	9) Bad controller.	9) Replace "7234" or "7995" controller relay inside the light box
10) Pitching machine runs as soon as light box is plugged into power. No lights come on.	10a) Defective "machine relay".	10a) Replace "7227" MACH "A"/ MACH "B" relay.
	10b) Bad "controller relay".	10b) Replace "7234" or "7995" controller relay inside the light box.

NOTE: For Dual Machine Systems remember to follow solutions on the appropriate circuit.

IV. PITCHING MACHINE

PROBLEM	CAUSE	SOLUTION
1) Token inserted, registers on display panel, all components work <u>except pitching machine</u>. NOTE: To isolate problem, unplug machine from light box pigtail and plug directly into the outlet. If pitching machine <u>does not</u> work, proceed in this section. If machine <u>does</u> work, proceed to <u>problem 3</u> in the light box section.	1a) Bad connection in power cord male plug.	1a) Remove male end of plug and check for loose wires.
	1b) Defective pitching machine motor.	1b) To verify, check for 115VAC at motor, where power cord is connected. If no power is present, replace "pitching machine motor".
2) Inaccurate count on pitched balls.	2a) Arm on microswitch is not bent enough to count balls accurately.	2a) If pitching machine is pitching more balls than programmed for, bend arm on microswitch up slightly. If pitching machine is pitching fewer balls than programmed for, bend arm on microswitch down slightly.
	2b) Wires to microswitch have been knocked off or are loose.	2b) Check wire connection at microswitch, tighten or reconnect as needed. Crimp new fork terminal on wire if it has pulled out of fork terminal.
	2c) Defective "Ball Count Microswitch".	2c) To verify, remove wires from microswitch, touch them together and release. Every time you touch and release, one ball should count down. Have someone observe display panel when conducting this test. If you obtain a count down on display panel with this test, replace microswitch.
	2d) Damaged Belden cable.	2d) Inspect Belden cable for breakage, cuts, or nicks. Repair as needed.
3) Inaccurate pitches.	3a) Incorrect wheel to wheel spacing or wheel to pad spacing.	3a) Verify proper spacing, adjust if necessary. Refer to Servicing Your Equipment, on 47.
	3b) Wheels on machine are worn.	3b) Inspect wheels for excessive wear, uneven wear, or chunks of material that are missing. Replace wheel "immediately".
	3c) Wheels are not parallel to each other.	3c) Make sure ball contact surfaces on wheels are parallel to each other. Adjust wheel shaft to correct alignment.
	3d) Balls are worn out.	3d) Inspect balls for wear and replace as needed.

PROBLEM	CAUSE	SOLUTION
PROBLEM 3 CONTINUED.	3e) Varying sizes of balls in system.	3e) If new balls are added to old balls, inaccurate pitches may result. Maintain a consistent size of balls.
	3f) Dirt build-up on wheels.	3f) Inspect wheels for steady build-up. Wheels may be cleaned with a rag and acetone, with machine turned off. For heavy build-up, use a 60 grit emery cloth.
	3g) Plastic feed chute (tongue) is out of alignment.	3g) Re-adjust as shown on page 42.
4) Pitching machine is noisy.	4a) Drive belt on machine is worn or frayed.	4a) Replace "AA-55" drive belt.
	4b) Bearing on idler pulley is bad.	4b) Replace idler pulley.
	4c) Wheel shaft bearing is worn.	4c) Replace wheel shaft bearing.
	4d) Incorrect wheel spacing on machine.	4d) If wheels are too close, a loud "bang" will occur when a ball is pitched. Make shaft spacing adjustment. Refer to page 47.
5) Pitching machine is vibrating.	5a) Wheels on machine are out of balance, (harmonic imbalance).	5a) Adjust speed of machine slightly in one direction or the other. Many times a difference in Rpm's will make a vibration go away. Or interchange top and bottom wheels.
	5b) Drive belt on machine is worn or frayed.	5b) Replace "AA-55" drive belt.
	5c) Wheel wobble.	5c) This occurs when wheels are not mounted properly and causes the wheels to wobble side to side. Remove wheel, flip shaft collar around and make sure all mating surfaces are clean, then remount the wheel. If wobble still exists, interchange or replace wheel.
6) Unable to change speeds on pitching machine.	6a) Hex head jam nuts on "speed crank" screw are not turning with crank screw, when turning to adjust speed.	6a) Use two 3/4" wrenches and tighten the nuts into each other. Make sure to locate the nuts properly on "speed crank" screw before tightening.
	6b) Variable speed pulley is frozen in one position.	6b) Before changing variable speed pulley, refer to page # 50 or contact ABC for details on how to free pulley.

PROBLEM	CAUSE	SOLUTION
7) Machine requires frequent adjustments, for balls that are pitching high/ low.	7) Locking nut on hi/low crank handle is tightened in wrong location.	7) Refer to page # 45 for proper adjustment of Hi/Low Crank Handle.
8) Main frame on pitching machine is cracking	8) Improper shaft spacing (too close) on the machine.	8) Adjust wheel shaft to proper spacing. Refer to page # 47 for correct dimensions. If frame is cracked, call ABC for further instructions on how to repair.

V. AUTOMATIC CONVEYOR SYSTEM

1) Conveyor belt is not moving.	1a) No power at the outlet.	1a) Make sure power cord is plugged in all the way. Check for power at the outlet with a multimeter or by plugging in a drill, radio or other device. If no power is detected check circuit breaker.
	1b) Conveyor motor drive belt has derailed.	1b) Lift up on motor and install drive belt. Check pulley alignment.
	1c) Ball stuck in conveyor.	1c) Dislodge any balls that are stuck in the conveyor, look down inside the bottom end of the conveyor for balls jammed around conveyor belt pulley.
	1d) Damaged power cord.	1d) Check for nicks or cuts in power cord. Repair or replace as needed.
	1e) Damage to male end of power cord.	1e) Remove male end of plug and check for damaged or loose wires.
	1f) Defective conveyor motor.	1f) To verify, check for 115VAC at motor. If voltage is present, replace motor.
	1g) Loose elevator flight bolts catching on top end of conveyor.	1g) Tighten loose elevator flight bolts. NOTE: DO NOT OVER TIGHTEN BOLTS.
	1h) Bad “current sensor”.	1h) Replace “current sensor” or call ABC for verification.

PROBLEM	CAUSE	SOLUTION
2) Baseball and/or softball distributing motors are not turning.	2a) Stuck ball in hopper area.	2a) Dislodge any jammed balls.
	2b) Circuit breakers on baseball/softball hoppers have popped.	2b) Check for any jammed balls, dislodge them, and reset circuit breakers on hoppers.
	2c) Power cord knocked loose by balls.	2c) Check power cord at outlet.
	2d) Damaged power cord.	2d) Check for nicks or cuts on power cord. Repair or replace as needed.
	2e) No power at outlet.	2e) Check circuit breaker in service panel, if okay call ABC for instructions.
	2f) Bad “current sensor”.	2f) Replace “current sensor” or call ABC for verification.
3) Ball troughs are not filling with balls.	3a) Balls not returning to sump area.	3a) Dislodge balls from back of stalls in pit area and all other areas in batting cage.
	3b) Ball quantity is low.	3b) Add balls to system (add a dozen at a time and watch for results).
	3c) Balls are hung up in various areas.	3c) Check for balls hung up in various areas (i.e. holes in netting, hung up by pitching machine power cords, etc...)
	3d) Foreign object stuck in trough.	3d) Dislodge foreign objects.

MAINTENANCE PROCEDURES

Pages 35 thru 40

DAILY MAINTENANCE, VISUAL INSPECTIONS AND OPERATIONAL PROCEDURES

DAILY CHECKLIST

1. Clean debris from batting area (pit, stalls, etc...)
2. Visually inspect the coin box for damage and repair as necessary.
3. Visually inspect batters stalls for any holes in netting, properly hung back stop pads and well marked batters boxes. Repair if necessary.
4. Walk the inside perimeter of the cage visually checking for ripped netting ties at lower fence, holes in net (including overhead), broken cables, and fencing connections.
5. Visually check pitching machine area (the pit) for netting holes, rips in netting tie downs, etc. Repair if needed.
6. Visually check where balls are pitching through the Netting Holes. Balls must pass through the middle of the holes (not closer to any edge of hole). Make adjustments to net holes as needed. Refer to page 44.
7. Visually check light box warning lights for proper operation. Replace any broken lens or defective light bulbs.
8. Visually check 90 degree drop for proper alignment with ball chute. Check proper spacing between ball drop from 90 degree drop and top of ball chute. Proper spacing is 3.5 inches of drop for baseball and 4.5 inches of drop for softball. Adjust as necessary. Refer to page 42.
9. Visually inspect ball chutes and ball guide chutes for proper alignment.
10. Visually inspect pinch roller wheel for damage or wear. Replace if necessary.
11. Visually inspect pitching wheels for damage or wear. Replace if necessary.
12. Visually check guide chute "micro switch" cord from light box for proper attachment. Be certain that each wire lead has a properly attached crimp-on "fork terminal" and that it is firmly connected to the micro switch leads. Replace "wire ties" that attach micro switch wire to ball guide chute if broken.
13. Manually feed balls through pitching machine and watch carefully for accurate pitches and make adjustments as necessary. Drop a token in each coin box and count the number of pitches to assure micro switch is counting correctly. Check for proper sequencing of light box. Section of Trouble Shooting Guide pages 27-29
14. Turn on hopper/feeding system and observe its operation.
15. Visually check underneath fiberglass shroud at the bottom of the conveyor system before the machines have been turned on for any debris that could block the conveyor.
16. Visually check bats for cracks and worn out grips. Replace as needed.
17. Visually check all batting helmets for cracks or defects. All helmets must have protective face masks attached. Replace helmets/facemasks as needed.
18. Visually check balls for excessive or uneven wear, cracks or breaks. Replace as needed. Remember, never mix old balls with new balls. Replace balls all at one time to assure consistent ball wear.
19. WHENEVER SERVICING OR CONDUCTING INSPECTIONS, ALWAYS KEEP LOOSE CLOTHING A N D LONG HAIR AWAY FROM ANY MOVING PARTS! SERIOUS INJURIES COULD RESULT!
20. See section "Daily Operational Forms & Checklists".

IF YOU HAVE ANY QUESTIONS ABOUT ANY OF THESE INSPECTIONS OR PROCEDURES AFTER REVIEWING AND CHECKING FOR MALFUNCTIONS, CALL "ABC" IMMEDIATELY @ 1-800-578-2243

WEEKLY MAINTENANCE SCHEDULE and OPERATIONAL PROCEDURES

WEEKLY CHECKLIST

1. Wash entire batting cage floor.
2. With pitching machine turned off, remove belt cover and check condition of belt. Then check the variable speed pulley assembly for expansion and contraction by pushing the outside of the pulley assembly back and forth. The sides of the pulley will slide back and forth over the shaft of the pulley. If the pulley is "sticky" or does not move freely, lubricate the grease fitting with one pump of grease from the grease gun. Note: Batting Range locations with dry or sandy areas should be certain to check these pulleys weekly.
3. Check tension of BALL conveyor. Loosen or tighten as needed.

MONTHLY MAINTENANCE SCHEDULE

MONTHLY MAINTENANCE AND OPERATIONAL PROCEDURES

1. Grease pillow blocks at both ends of the conveyor.
2. Lubricate shaft bearings - one pump every month per bearing. DO NOT OVER GREASE- this can reduce the life of the bearing.
3. Lubricate variable speed pulley every 3-4 weeks, approximately 4 pumps per grease fitting, then run speed of machine up and down 3-4 times to distribute the grease.
4. Overall visual and audio inspection every month checking for loose bolts, worn belts, loud bearings, etc...
5. Clean debris from sump area below fiberglass shroud.
6. Check roof over pitching machines for broken wood, Repair as necessary.
7. Check lighting for all cages.
8. Re-paint batting stall home plate and batters boxes as needed.
9. All batting stall gates must have auto-closing springs. Check them for proper tension (If your gates do not have auto-closing springs, install them). Check for gaps in gates where balls could escape and adjust as necessary.

IF YOU HAVE ANY QUESTIONS ABOUT ANY OF THESE INSPECTIONS OR PROCEDURES AFTER REVIEWING AND CHECKING FOR MALFUNCTIONS, CALL "ABC" IMMEDIATELY @ 1-800-578-2243

MAINTENANCE SCHEDULE

NOTE: Use *Multi-Purpose Lithium Grease* when lubricating equipment.

PITCHING MACHINE	Daily	Weekly	2 Weeks	Monthly	3 Months	6 Months	As Needed
SHAFT BEARING - LUBRICATION (1 PUMP)				√			
VARIABLE SPEED PULLEY - LUBE (3 PUMPS)			√				
CRANK HANDLE - LUBRICATION				√			
SHAFT BEARING SET SCREWS				√			
PITCHING ACCURACY	√						√
WHEEL WEAR		√					
WHEEL CLEANING			√				
DRIVE BELT INSPECTION		√					
MOTOR INTAKE VENT CLEANING (ONLY ON "OPEN DRIP PROOF MOTORS")				√			
CHECK 90 DEGREE DROP ADJUSTMENT WITH BALL CHUTE	√						

CONVEYOUR SYSTEM	Daily	Weekly	2 Weeks	Monthly	3 Months	6 Months	As Needed
PULLEY BEARINGS - LUBE (1-2 PUMPS)						√	
CONVEYOR BELT TENSION							√
POWER CORD INSPECTION		√					
90 DEGREE DROP ALIGNMENT	√						
PINCH ROLLER WHEEL ADJUSTMENT		√					
PINCH ROLLER WHEEL SET SCREW			√				
PINCH ROLLER ELECTRICAL CONNECTIONS	√						

LIGHT BOX	Daily	Weekly	2 Weeks	Monthly	3 Months	6 Months	As Needed
BROKEN RED/AMBER LENSES	√						
LIGHT BULBS	√						
POWER CORDS		√					
ELECTRICAL CONNECTIONS		√					
CIRCUIT BOARD MOUNTING SCREWS				√			
DOOR CLAMPS							√

NETTING	Daily	Weekly	2 Weeks	Monthly	2 Months	6 Months	As Needed
CABLE - ADJUSTMENTS							√
HOLE REPAIR							√
NET SLACK (FROM STRETCHING)							√
BALL EXIT HOLE ALIGNMENT	√						

GENERAL	Daily	Weekly	2 Weeks	Monthly	2 Months	6 Months	As Needed
BATTERS BOX & HOMEPLATE				√			
SELF CLOSING GATE DOORS	√						
WARNING SIGN CONDITION		√					
CHECK BATS CONDITION	√						
CHECK BALL CONDITION	√						

COIN BOX	Daily	Weekly	2 Weeks	Monthly	3 Months	6 Months	As Needed
TOKEN INSERT CLEANING				√			
ELECTRICAL CONNECTIONS		√					

Classification of part orders
All part orders classified into two groups

WARRANTY

MEMO INVOICE

* For parts with return value customer required to return defective parts within 30 days or invoice becomes payable in full.

N/C

for parts with no return value. Service Personnel will advise.

NON - WARRANTY

STANDARD BILLING

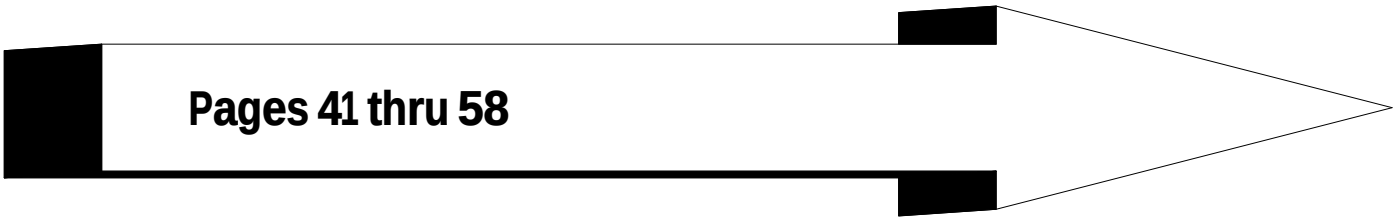
Net 30, C.O.D., etc..

N/C

for orders of small value. Sales Personnel will advise.

***** - All parts not returned within 30 days are subject to charges.

SERVICING YOUR EQUIPMENT



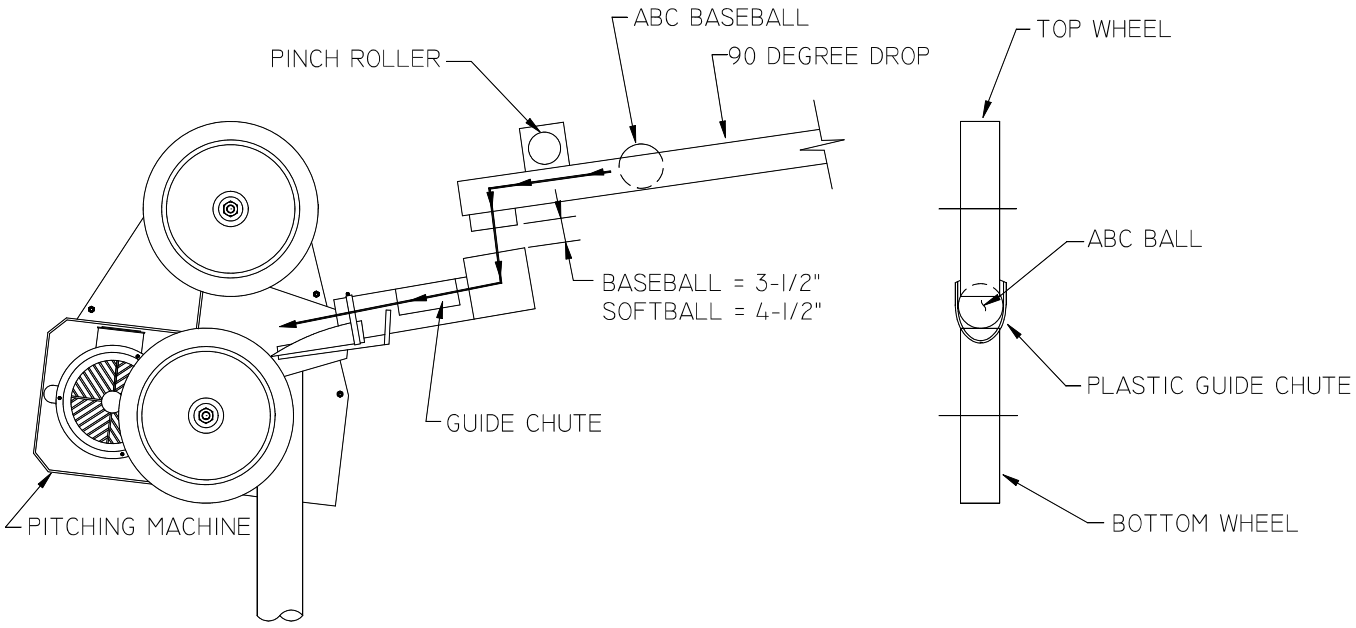
BALL VIEWING CHUTE ADJUSTMENT
and it's RELATIONSHIP to the 90-DEGREE DROP

Viewing Chute & 90 Degree Drop Adjustment:

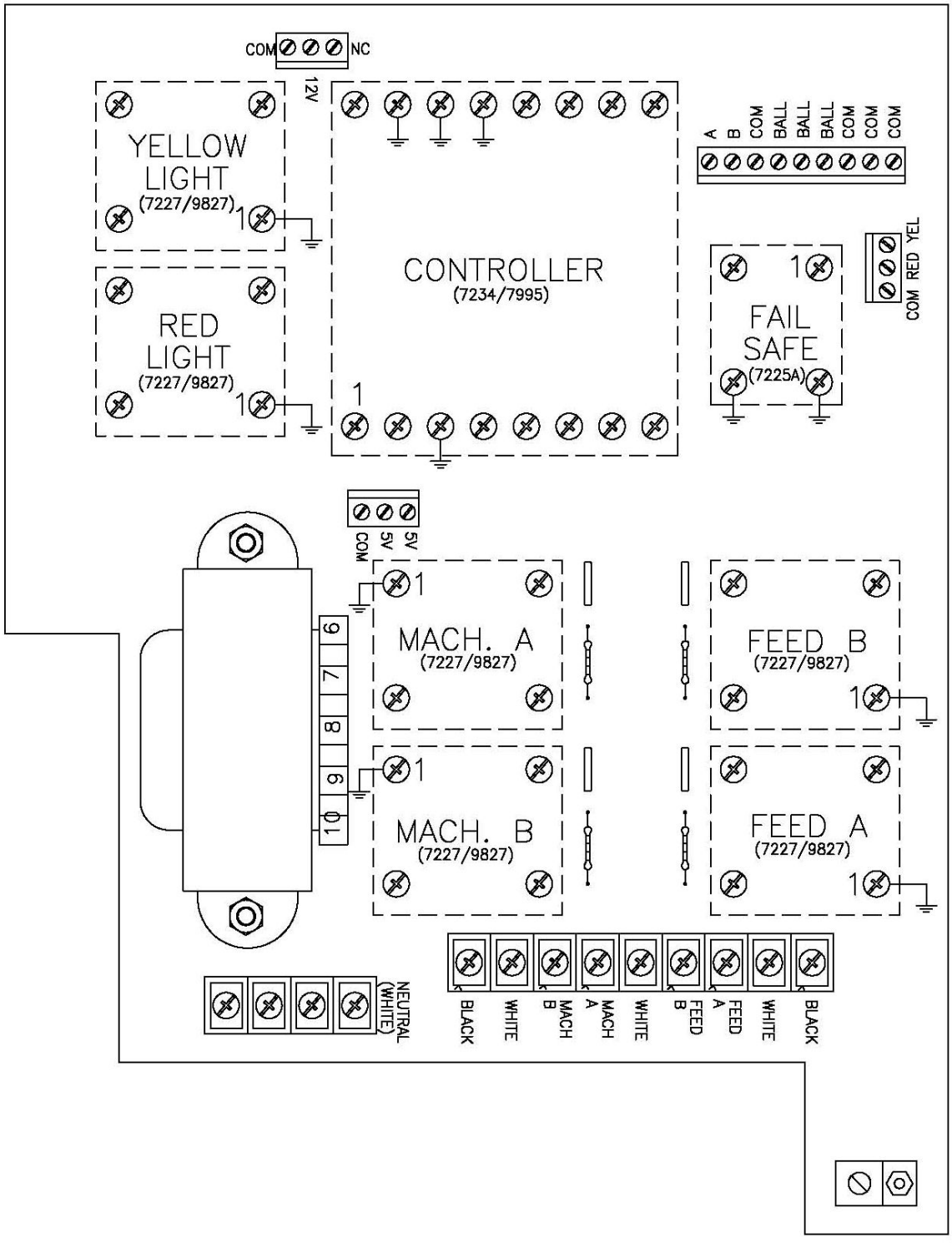
After setting the machine to the desired speed and trajectory, you must check the angle of the "ball viewing chute". There must be a slope angling downwards towards the wheels (gravity allows the ball to roll towards the wheels). The angle must be steep enough that a ball *always* rolls towards the wheels. If the machine needs to be pitched higher, the machine will need to tilt backwards, decreasing the angle of the "ball viewing chute" and the balls may not roll to the wheels. After determining the desired speed and trajectory of each machine and adjusting the "ball viewing chute" (to allow for balls to roll down to the wheels) verify that the balls exiting to the "90-degree drop" (after release from the pinch roller) **fall** into the "ball viewing chute". The ball "drop" should be no less than 3.5 inches for baseball and 4.5 inches for softball. "The 90-degree drop should never be resting inside of or touching the ball viewing chute". Please refer to (fig. 1a) below.

Ball Guide Chute Alignment:

1. Turn off the pitching machine (if the wheels are turning) by unplugging the pitching machine AC power cord from the warning light box. Keep loose clothing and long hair away from all moving parts.
2. Drop a baseball in the guide chute.
3. The ball will roll toward the wheels and should stop when in contact with the plastic guide chute and the top wheel.
4. The ball should not be touching the bottom wheel at this time, only the top wheel. By turning the top wheel forward, the ball should flex the plastic ball chute downward and then come in contact with the bottom wheel.
5. If the ball is not centered in the plastic ball chute or touches the top and bottom wheel when rolled down the guide, loosen the adjustable hose clamp and adjust the plastic guide chute to the desired location and re-tighten the hose clamp.



NOTE: ALL OF THE BASEBALL GUIDE CHUTES ARE ADJUSTED PROPERLY AT THE TIME OF EQUIPMENT INSTALLATION. BE CERTAIN THAT THE PLASTIC BALL CHUTE IS IMPROPERLY ADJUSTED BEFORE YOU ATTEMPT TO ADJUST. IF YOU HAVE ANY QUESTIONS CALL "ABC" IMMEDIATELY.



PT-4 CIRCUIT BOARD

NOTE: (*) indicates voltage present only when game is activated.

IMPORTANT NOTE:

It is common that after a rain storm or on a humid day your front machine net will sag, when this happens the net ring will lower, ultimately obstructing the flight of the ball. It is recommended that anytime this happens you immediately shut down that cage and re-adjust the net ring.

ADJUSTING NET RING

WARNING! Before any adjustment is made, make sure that nobody is batting in any of the cages. ABC recommends that you adjust the net rings in the morning before you open to the public, or after you close. Keep loose clothing and long away from all moving parts.

1) With a game activated and pitching, stand behind the machine and watch the flight of the ball to determine were it is hitting the net ring. After you have verified were the ball is hitting the ring, un-plug the light box power cord from the receptacle and mark the spot were the ball is hitting with a piece of tape.

2) For this step you will need 20 ft. of 1/4" nylon rope cut at 5 ft. lengths. With the four lengths of rope in your hand, position yourself in front of the pit net facing the pitching machines. Take one rope at a time and attach them as shown in figure 1a.

3) Now that the net ring is secured in place, it's time to adjust the ring directly in the center of the balls flight path. Locate the area on the ring were you marked it with tape. Using figure 1b. as an example, un-tie the rope in the area marked with tape and pull the rope until the center of the ring is directly in the middle of the balls flight path. **WARNING:** Before you allow anyone to hit in the cage , it's important that you pitch a round of balls through the ring to verify that the ball is flying directly through the center. **NOTE:** It might take 2 or 3 adjustments to center the ring.

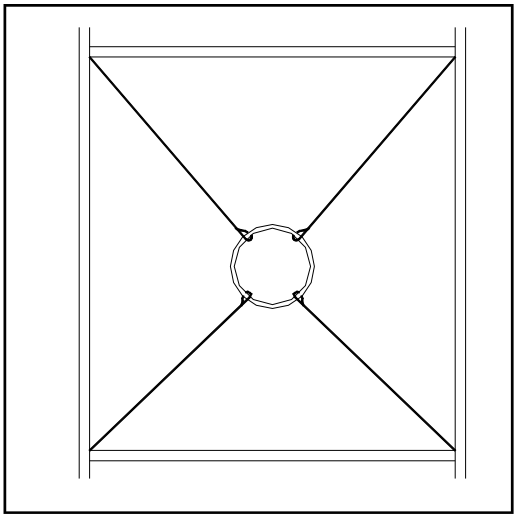


Figure 1a.

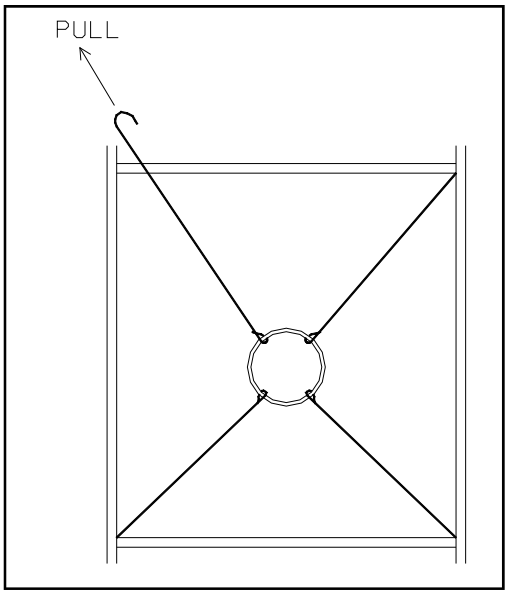


Figure 1b.

EQUIPMENT ADJUSTMENTS

PITCHING MACHINES

IMPORTANT NOTE: ACCURACY OF THE PITCHING MACHINE SHOULD BE CHECKED EVERY DAY BEFORE OPENING AND PERIODICALLY THROUGHOUT THE DAY. ALL ADJUSTMENTS MUST BE MADE WHILE THE HITTING STALL IS VACANT OF EMPLOYEES OR CUSTOMERS. VERIFY THAT THE BALL IS CONSISTENTLY PITCHING OVER HOME PLATE BEFORE ALLOWING ANY CUSTOMERS TO ENTER THE HITTING STALL. (WHILE SERVICING OR ADJUSTING EQUIPMENT ALWAYS KEEP LOOSE CLOTHING AND LONG HAIR AWAY FROM ALL MOVING PARTS! SERIOUS INJURIES COULD RESULT)

BALL VELOCITY ADJUSTMENT

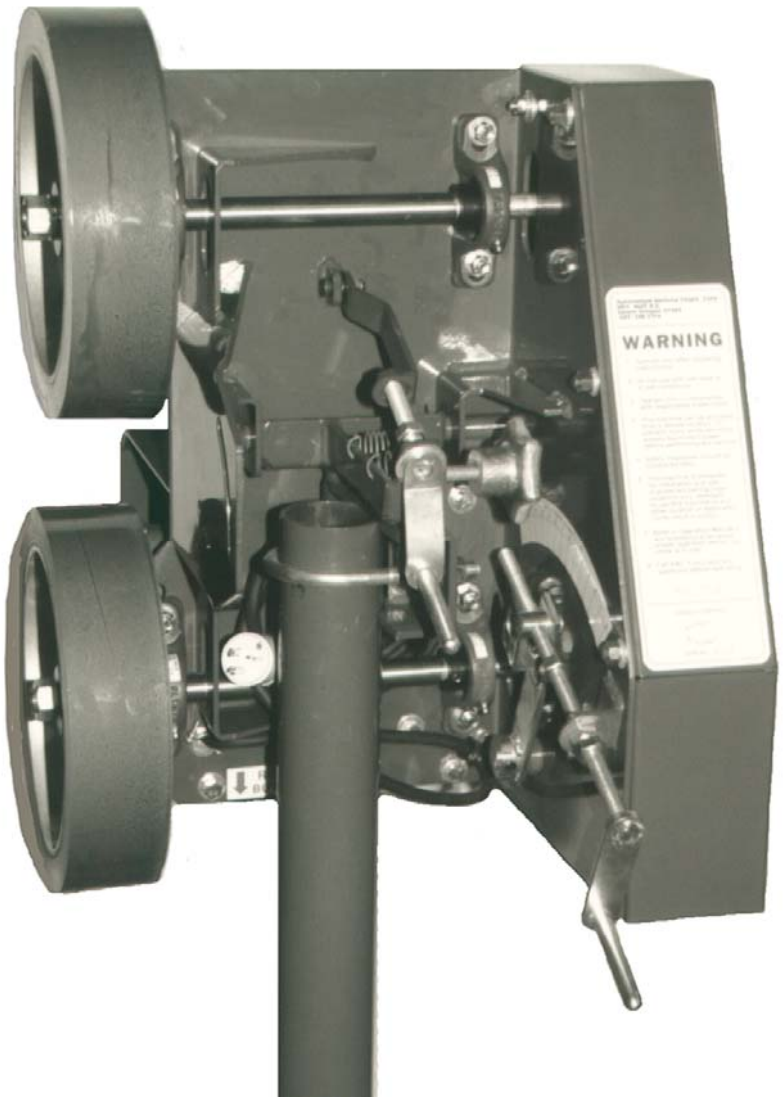
The speed of the ball is increased or decreased by adjusting the "Variable Speed Pulley". This is accomplished by turning the "Speed Adjust Crank handle" (part # 080) in the appropriate direction. See diagram (page 46) Standing behind the machine, a clockwise rotation will decrease velocity, while a counterclockwise rotation will increase velocity. To make a speed adjustment, loosen the "Speed Crank Jam Nut", and turn the handle in the desired direction. When speed adjustment has been completed, tighten the Speed Crank Jam Nut to secure the handle in that position. The trajectory (High/Low) of the pitch and Right/Left adjustment will need to be checked and/or re-adjusted after any speed change. For exact MPH of pitches a hand held radar gun would be required.

HIGH/LOW ADJUSTMENT

The pitching height may be raised or lowered by turning the "High/Low Crank Handle" (part # 082) in the appropriate direction, see page 46. A clockwise rotation will raise the pitch, while a counterclockwise rotation will lower the pitch. To make a trajectory adjustment, loosen the "High/Low Crank Jam Nut", and turn the handle in the desired direction. When the adjustment has been completed, tighten the "High/Low Crank Jam Nut" to secure the handle in that position.

RIGHT/LEFT ADJUSTMENT

Pitches may be adjusted right or left by two methods. For minimal adjustments, use the "Right/Left Adjust Knob" located on the post mount assembly. To make an adjustment, loosen the R/L Adjust Knob Jam Nut" and turn the knob in the appropriate direction, see page 46. When the adjustment has been completed, tighten the "R/L Adjust Jam Nut" to secure in position. For large right or left adjustments, turn knob until post mount assembly is positioned approximately halfway of it's travel. Loosen nuts on U-Bolt and re-position entire machine so that balls are passing over the center of home plate. Tighten U-Bolt by alternating back and forth between the two nuts, equally tightening each nut until secure. Once U-Bolt is tight, check pitch and fine tune using the "Right/Left Adjust Knob". Be sure to tighten jam nut when adjustment is complete.

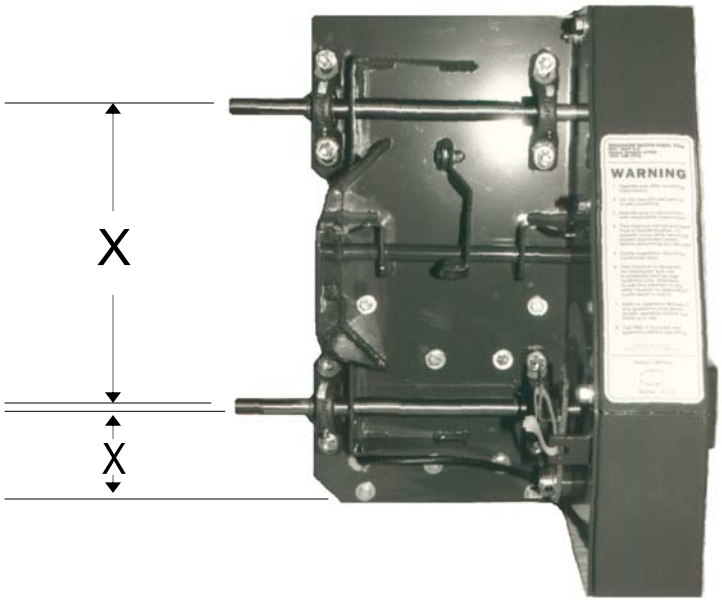

WARNING

WHEEL SHAFT ADJUSTMENTS

BASEBALL/SOFTBALL DIMENSIONS

X = Center of shaft to center of shaft Softball Fastpitch = 14” Baseball Slow/Medium/Fast = 13” Baseball Very Fast = 12-7/8”
Y = Edge of shaft to edge of frame Baseball = 4-1/2” Softball = 3-7/8”

NOTE: “Y” dimensions must be equal to insure shaft is parallel with frame.



VAS & SAS BEARING INSTALLATION

FAFNIR SELF-LOCKING COLLAR DIRECTIONS

Most Fafnir housed units are equipped with the self-locking collar to facilitate the mounting of wide inner ring bearings. This self-locking collar eliminates the need for locknuts, washers, sleeves and adapters.

The locking collar has a counter bored recess which is made purposely eccentric with the bore. The collar recess and the end of the bearing inner ring with which it engages are both machined so that they act as mating cams when on the shaft.

When the collar is engaged to the inner ring, it grips the shaft tightly with a positive binding action that increases with use. No adjustments of any kind are necessary.

1) Slip the shaft through the pillow block or other fafnir housed unit when incorporates the wide inner ring bearing. Be certain the bearing is aligned in position along the shaft to eliminate any possibility of cramping loads. Refer to dia. #1

2) Fasten the unit securely to the base using the proper bolt size specified in the catalog. Refer to dia. #2

3) Place the self-locking collar on the shaft with its cam adjacent to the cam on the end of the bearings inner ring. Turn the collar in the direction of shaft rotation. The eccentric recessed cam will slide over and engage the corresponding cam on the bearing inner ring. Refer to dia. #3

4) Using a lightweight hammer and drift pin inserted in the drift pin hole, strike in the direction of shaft rotation to positively engage the collar. The wide inner ring is now locked to the shaft. Refer to dia. #4

5) As a final step, fully tighten the set screw. It exerts a wedging action to hold the collar always in the engaged position, even under shock load. This fafnir design will operate effectively after the cams are tightly locked in most cases with no setscrew at all. Refer to dia. #5

DIA. #1

DIA. #3

DIA. #5

DIA. #2

DIA. #4

LIGHT BOX FUNCTIONS

YELLOW LIGHT RELAY (#7227)

This Relay turns the yellow light on when the game is activated either by the display panel or when a coin is dropped through the coin box.

RED LIGHT RELAY (#7227)

This relay turns the red light on 10 seconds after the yellow light is activated.

FAIL-SAFE RELAY (#7225)

The 7225 Fail-safe relay is an added safety feature in the PT-4 & PT-4Dual light box. The 12vac power for the red light flows through the 7225, this voltage triggers the 7225 which then provides a ground for the feeder relay(s). If the red light bulb is burnt out, the circuit remains open and prevents the feeder relay(s) from functioning.

"MACHINE A" & "MACHINE B" RELAY(S) (#7227)

"Machine A" relay (7227) provides triggering voltage (120vac) to the mercury displacement relay. The mercury displacement relay provides the power (120vac) for the pitching "Machine A" to operate. In a PT-4Dual light box "Machine B" relay (7227) provides triggering voltage to the additional mercury displacement relay. This mercury displacement relay would then provide power for the pitching "Machine B" to operate.

"FEEDER A" & "FEEDER B" RELAY(S) (#7227)

"Feeder A" relay (7227) provides power (120vac) to the pinch roller motor. In a PT-4Dual light box "Feeder B" relay (7227) provides power (120vac) to the dual system pinch roller motor. Operation of both motors would be discontinued if the red light bulb is burnt out.

MERCURY DISPLACEMENT RELAY (#6X597)

This is the large relay mounted inside the PT-4 light box, it is used to turn on the pitching machine motor. If you have a PT-4Dual light box there will be (2) large relays mounted inside the light box. One of the relays turns on the baseball machine motor (Machine A) and the other relay turn on the softball machine motor (Machine B). **NOTE: If you own a PT-4Dual light box each relay operates individually with its designated pitching machine and not as one.**

CONTROLLER (#7995)

The controller has the logic that controls the sequence in which the relays are turned on and off.

The game sequence is as follows:
1) At the time of the coin drop, both the yellow light and the pitching machine motor turn on.
2) Ten seconds later, both the red light and the pinch roller motor turn on. Balls begin to pitch.
3) After the last ball is pitched, both the red and yellow lights and the pinch roller turn off. The pitching machine will continue for ten minutes.
4) After 8-10 minutes, if no one has started a new game by dropping a coin or via master panel, the pitching machine will turn off. **NOTE: If there is any irregularity in timing or sequence, change the #7995 controller.**

TRANSFORMER

The transformer lowers the voltage from 115vac to 12-14vac for the red and yellow lights. These are automotive lights and can be purchased at any auto parts retailer.

VARIABLE SPEED PULLEY

1) “FIG A” illustrates maximum speed of pitching machine and gives the dimension for sliding action (x-dimension) of pulley.

1a) The maximum speed is obtained by turning the speed handle “counter clockwise”. **NOTE:** Notice in “FIG. A” the outer edge of the pulley does not exceed this, as it will cause your belt to “wear prematurely” or “derail”.

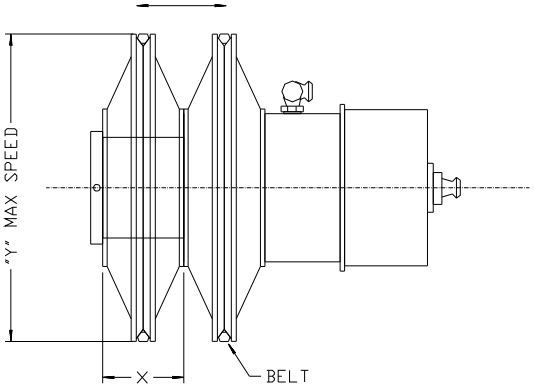
2a) The sliding dimension, shown a “X” in “FIG. A” is to check if your pulley is sticking and needs to be lubricated. To verify if your pulley is good, remove the belt and push pulley towards the pitching machine motor until it touches the “shaft collar attachment”, (FIG. C) then let go. The pulley should slide back into place at approximately 1/2” to 5/8” from surface to surface as shown in “FIG. A”.

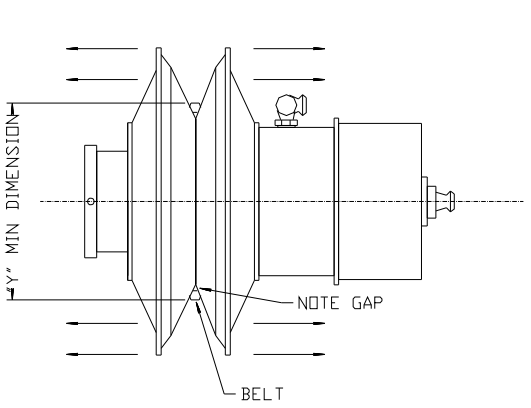
2) “FIG. B” illustrates minimum speed of pitching and gives the spreading action of the pulley halves.

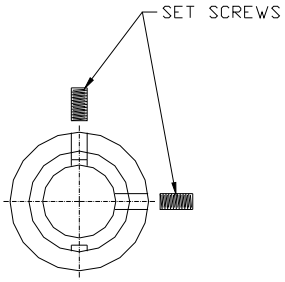
1b) The minimum speed is obtained by turning the speed handle “clockwise”. **NOTE: N**otice in “FIG. B”, when the pitching machine is at its slowest speed, there is a gap between the belt and the inner surface of the Variable Speed Pulley, “ Do not exceed this”. If the belt is allowed to bottom out on the pulley shaft it will wear the belt “prematurely”.

2b) The sliding action shown with the arrows in “FIG. B” is the direction the pulley halves should move when slowing the pitching machine down. When speeding machine up to maximum speed, pulley halves should close as per “FIG. A”. If the sliding action is not functioning as shown id “FIG. A” & FIG. B”, grease Variable Speed Pulley as suggested in Maintenance Procedures in your ABC owners manual, or replace pulley immediately. **NOTE:** When installing new Variable Speed Pulley, make sure that the pulley halves lines up with the bottom wheel shaft pulley.

3) “FIG. C” illustrates the correct way to insert the (2) set screws. Notice in “FIG. C” the top screw tightens down on the “motor shaft keyway”. Also notice that the set screw on the right tightens down on the edge of the “motor shaft”. Failure to tighten set screws in proper location will cause Variable Speed Pulley to slide off the end of the shaft or slide enough to throw the belt off the pulleys.







BATTING CAGE WINTERIZATION

GRAVITY FLOW DRAIN SYSTEM

1) Turn power off leading to A/R Conveyor System and pitching machines.

2) Place plastic bag over pitching machine, light boxes and coin boxes, ventilate bottom of bags.

3) Remove fiberglass shroud then disconnect conveyor from hopper and place in area away from rain, snow, sleet etc...

4) Netting System: The safest method to protect your net and pipe structure would be to un-tie the rope lanyards at every perimeter pole and let the net hang straight down from the net collar. Another method that would give you a comfortable degree of safety and saves you the job of pulling the net back up in the spring is as follows.

a) Tie a piece of net twine to the metal ring in the net, then tie it off to the horizontal rail.

b) Un-tie rope lanyards from perimeter vertical pipe, leaving un-tied end of rope resting on the canopy net.

This will hold the net in place, yet the single strand of twine would break loose under a heavy load. Upon opening in the spring you would need to re-tie the rope lanyards to the vertical pipes.

5) Unplug Micro-Processor power cord from outlet and remove all processor cards located in the middle of Micro-Processor Box, then place cards in a safe area.

ELECTRIC POWERED SUMP PUMP DRAIN SYSTEM

1) Place plastic bag over all pitching machines, then ventilate the bottom of each bag.

2) Remove light boxes and place in a covered area away from direct weather. Cover up any bare wiring and place away from flooding levels.

3) Remove fiberglass shroud then disconnect conveyor from hopper and place in area away from rain, snow, sleet, etc...

4) Netting System: Refer to #4 of “gravity flow drain system”.

5) Unplug Micro-Processor power cord from outlet and remove all processor cards located in the middle of Micro-Processor Box, then place cards in a safe place.

NOTE: If you have any questions before winterizing please call ABC’s Customer Service Department for questions.

CURRENT SENSOR INSTALLATION DIRECTIONS

WARNING! DISCONNECT POWER FROM SUB PANEL BEFORE BEGINNING.

1) After verifying that power has been interrupted from sub panel, remove the two main feeder lines from terminal blocks. Slip the main lines through the holes in the Current Sensor and re-connect to terminal blocks.

2) Mount Mercury Displacement Relay in the back or on the side of the sub panel.

3) Route original switched line going to conveyor duplex to the bottom lug of the relay (south). At this time install the power feed wire to the same relay lug and then to the Current Sensor bottom screw as per Drawing.

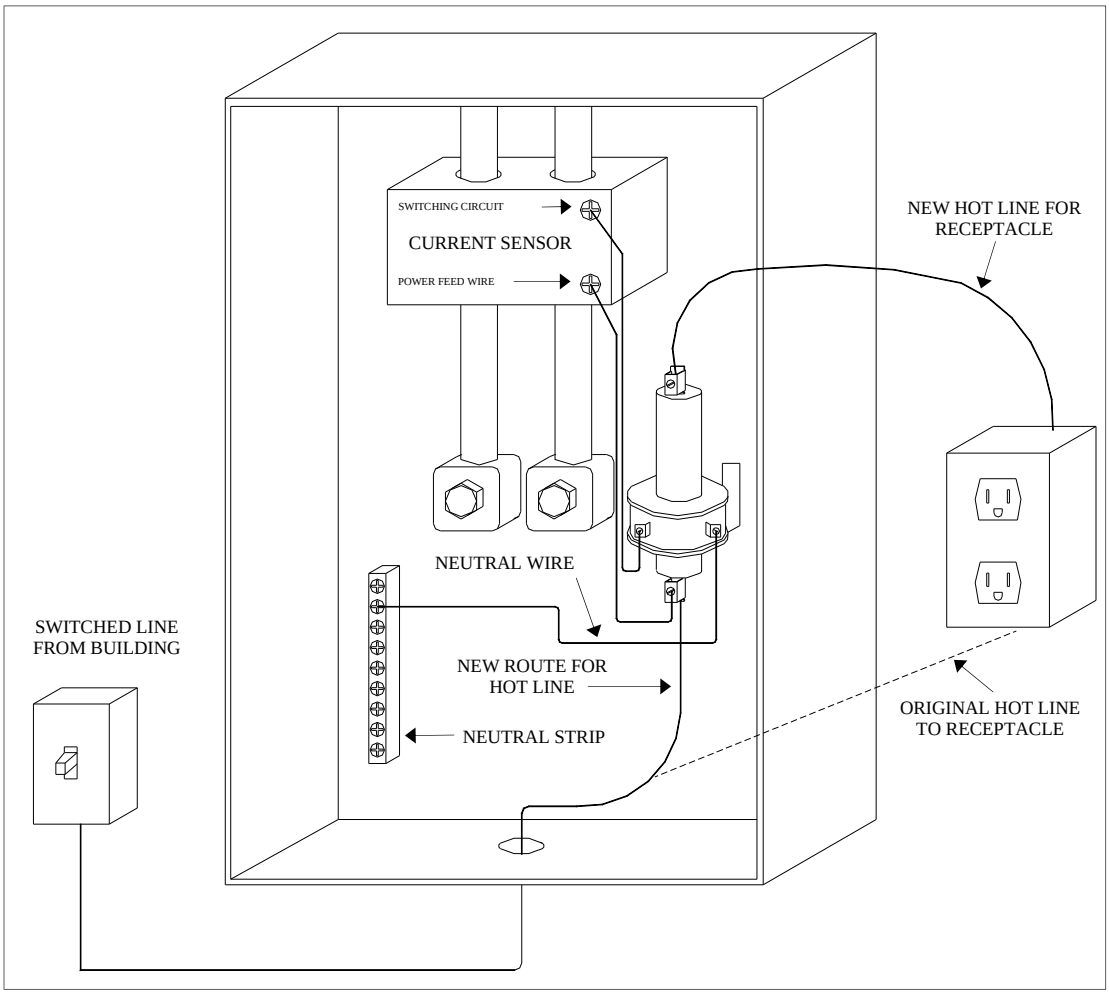
4) Install new hot line to conveyor receptacle as shown in drawing.

5) Install neutral wire from Mercury Displacement Relay (east) to neutral strip inside sub panel.

6) Connect switching circuit wire from Current Sensor top screw to the Mercury Displacement Relay (west).

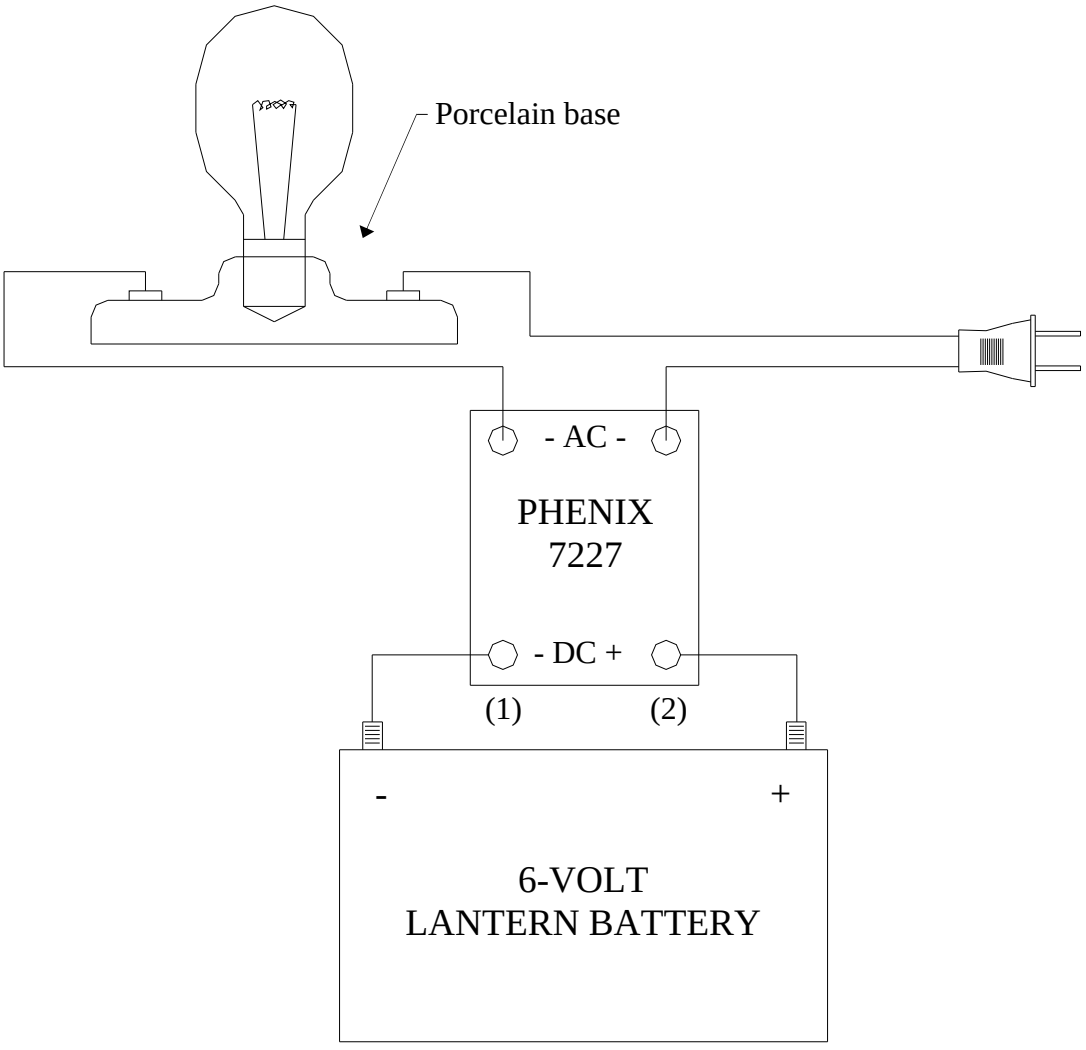
7) Leave On/Off switch in the building for the conveyor receptacle in the "ON" position for proper operation of the Current Sensor.

NOTE: If the main lines from your sub panel have any other hot lines besides the pitching machine hot lines going through the Current Sensor such as sump pump, conveyor receptacle, lights, etc... this could result in the conveyor belt running contiguously. To correct this problem you have two choices, you can either cancel out all the extra hot lines or route only the pitching machine receptacle hot lines through the Current Sensor. If you have any further questions contact ABC's Service Department.



TEST JIG FOR 7227 SOLID STATE RELAY

1) Assemble test jig as shown below
2) Connect wire to A/C side of relay.
3) Plug cord into 115vac. If light comes on without D/C side attached, relay is bad.
4) Connect 6vdc battery to D/C side of relay, the light should turn “ON”.
5) If light does not turn on, the 7227 relay is bad.



CONVERTING SOFTBALL SLOW PITCH TO SOFTBALL FAST PITCH

The Fastpitch Softball Chute and its accessories were inspected before shipping and should be in good condition when you receive them. If shipping damages exists, immediately notify the carrier and the ABC Customer Service Department at 1-800-578-2243

If you need to return the part to the factory:

- Send back defective part attention to Customer Service Department
- Attach a card with your company's name, address, person to contact and phone number.
- Provide a short written description of the damage.

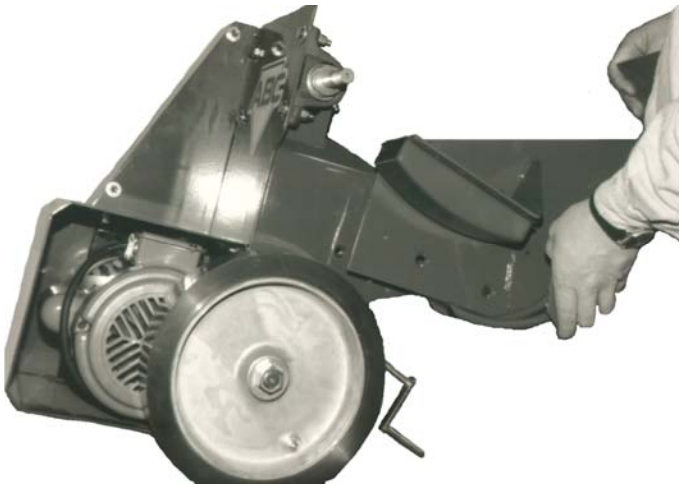
REMOVING SLOW PITCH SOFTBALL CHUTE

1) Get a screwdriver and remove the white and black wires from the Ball Count Microswitch located on your existing slow pitch softball chute, refer to figure 1a.

2) With an allen wrench and a 9/16" box end wrench. Remove the slow pitch chute as shown in figure 1b.

Fig. 1a

Fig. 1b



APPLICATION OF FAST PITCH SOFTBALL CHUTE

1) Slide the shaft collar (#12) on to the top shaft all the way over until it touches the bearing, next put the pitching wheel (#010) on in the same manor that you mounted the shaft collar. Finally place the 3/4" flat washer, lock washer and nut on to the top shaft and tighten them down using a adjustable crescent wrench. Refer to figure 2a.

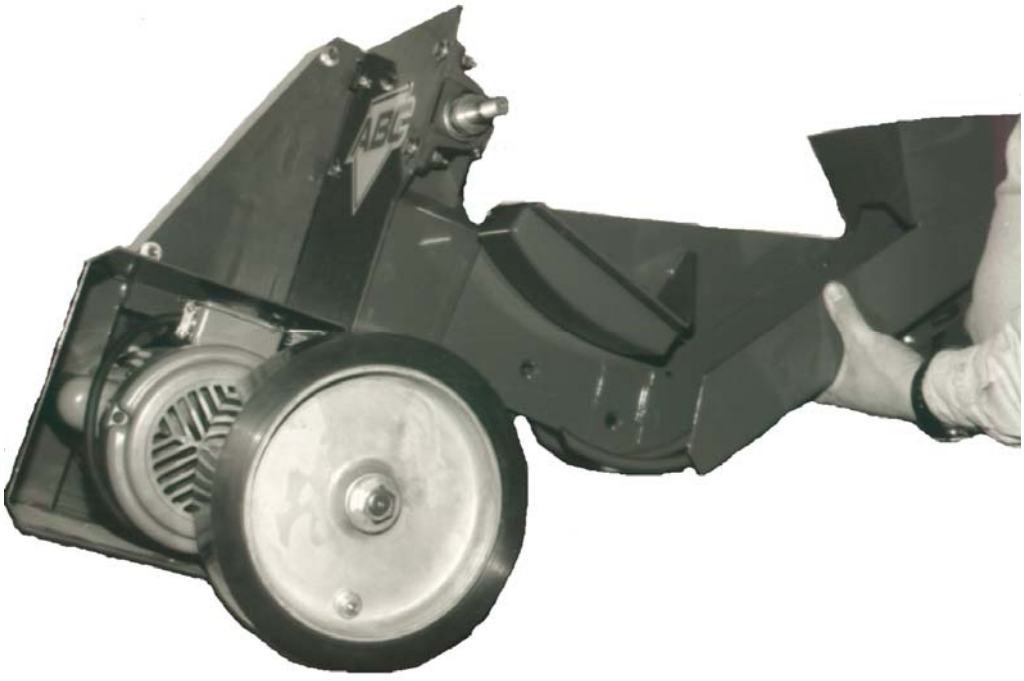
2) Attach the fast pitch softball chute to the same area you removed the slow pitch chute, using the existing nut & bolts. Refer to figure 2b

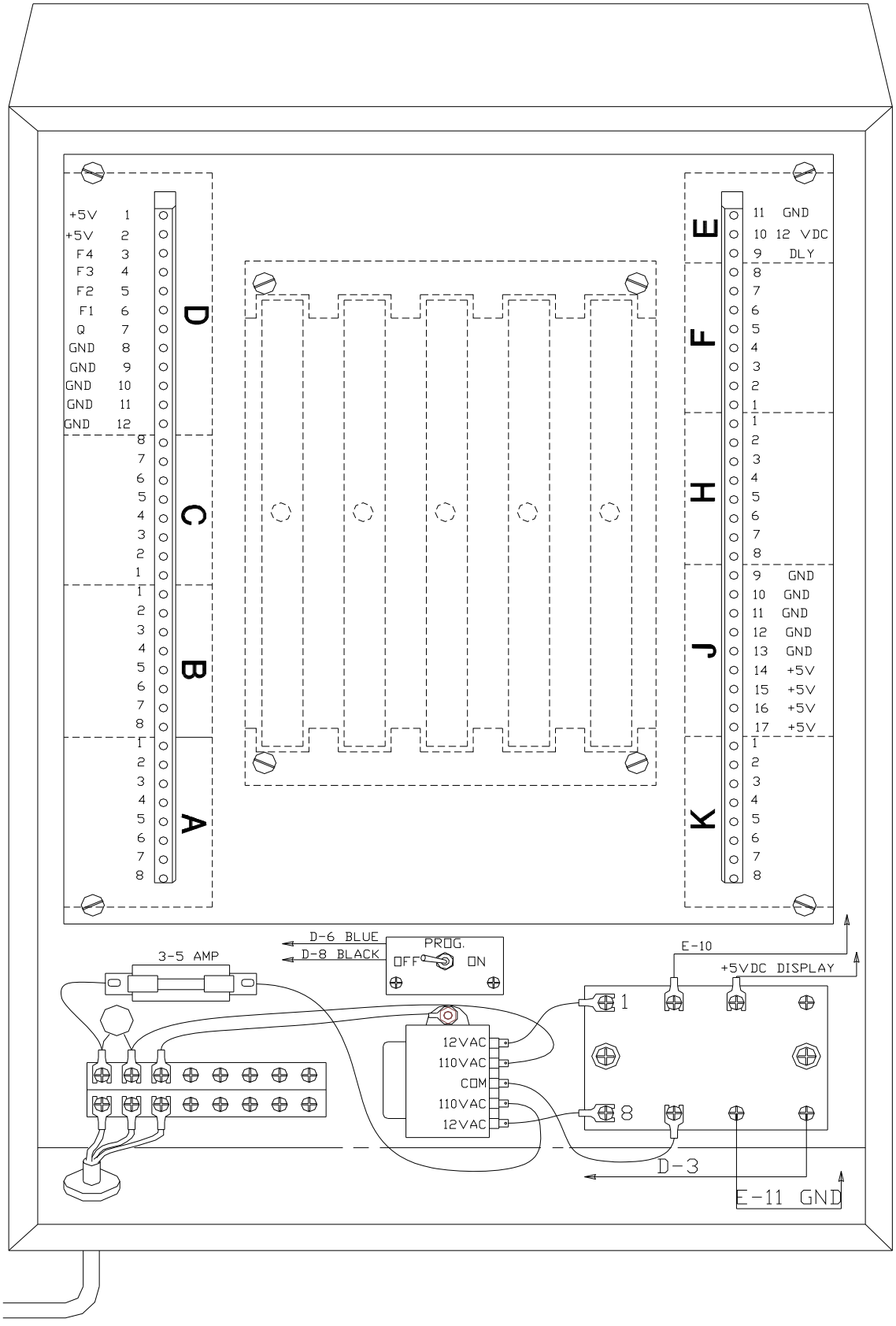
3) Re-attach the ball count microswitch wires, placing the black wire on normally open (NO) and the white wire on common (COM).

4) To adjust the accuracy and speed of your new fast pitch softball machine, refer to the Equipment Adjustments section, page no. 45 of your Owners Manual.

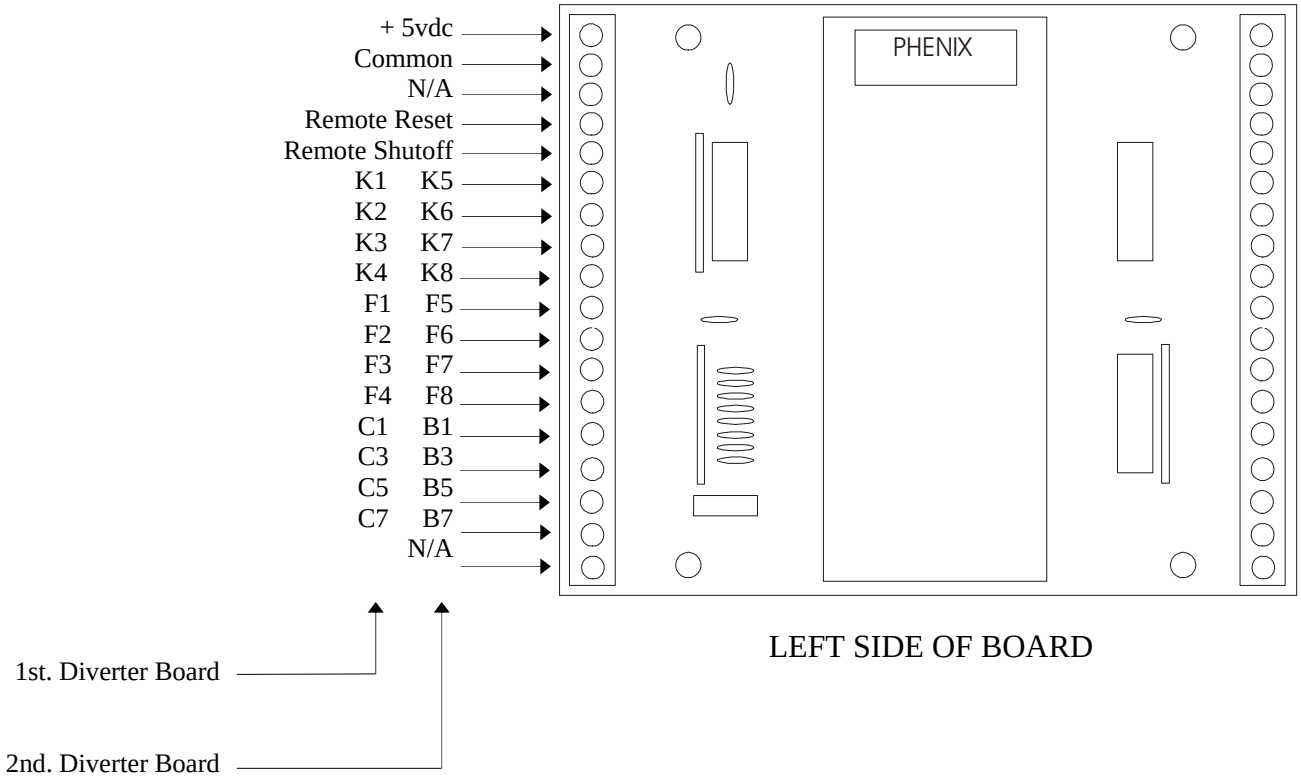
Fig. 2a

Fig. 2b

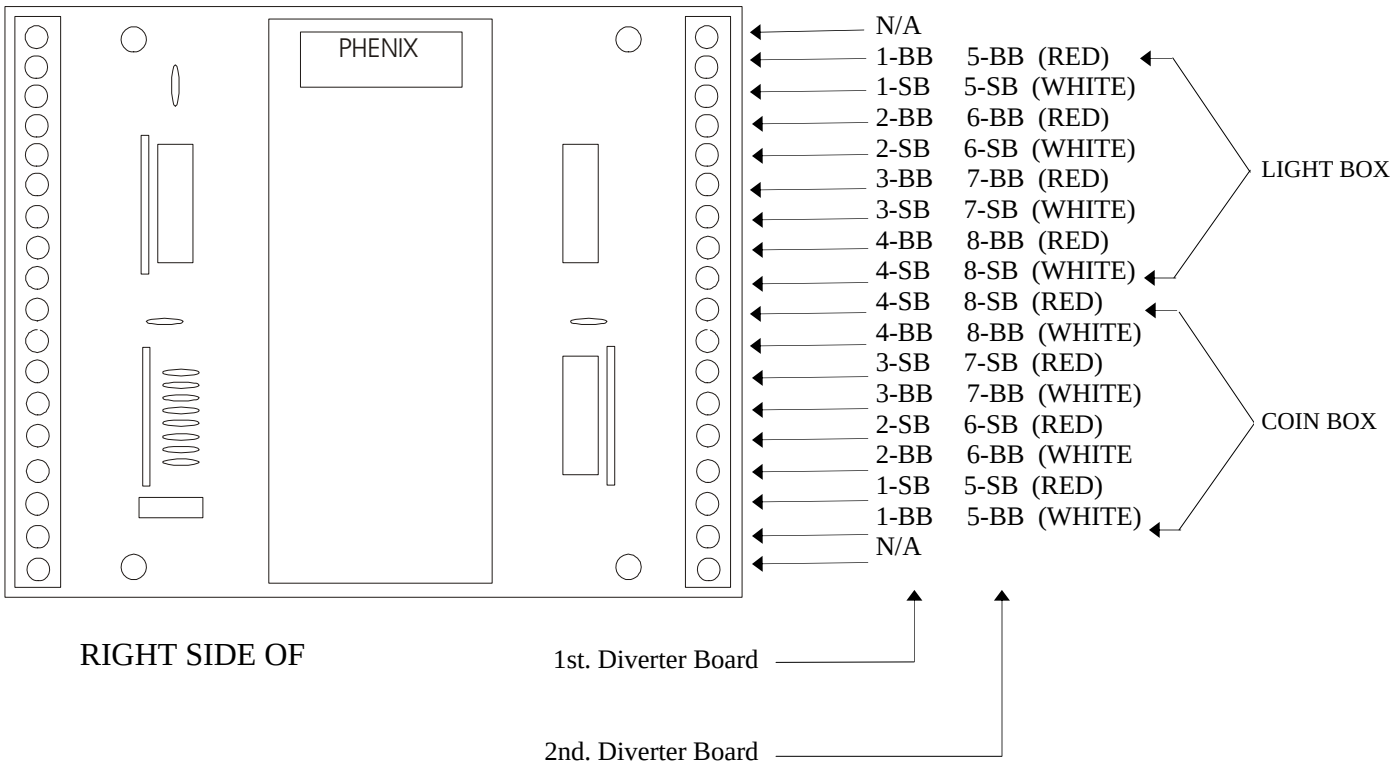



+5V 1
+5V 2
F4 3
F3 4
F2 5
F1 6
Q 7
GND 8
GND 9
GND 10
GND 11
GND 12
D
C
B
A
E
11 GND
10 12 VDC
9 DLY
F
H
J
9 GND
10 GND
11 GND
12 GND
13 GND
14 +5V
15 +5V
16 +5V
17 +5V
K
D-6 BLUE
D-8 BLACK
PROG.
OFF ON
3-5 AMP
E-10
+5VDC DISPLAY
12VAC
110VAC
COM
110VAC
12VAC
D-3
E-11 GND

DUAL LOCKOUT DIVERTER BOARD



LEFT SIDE OF BOARD



RIGHT SIDE OF

101 CARD USAGE INSTRUCTIONS

1) Disconnect microprocessor (gray box) from power supply.

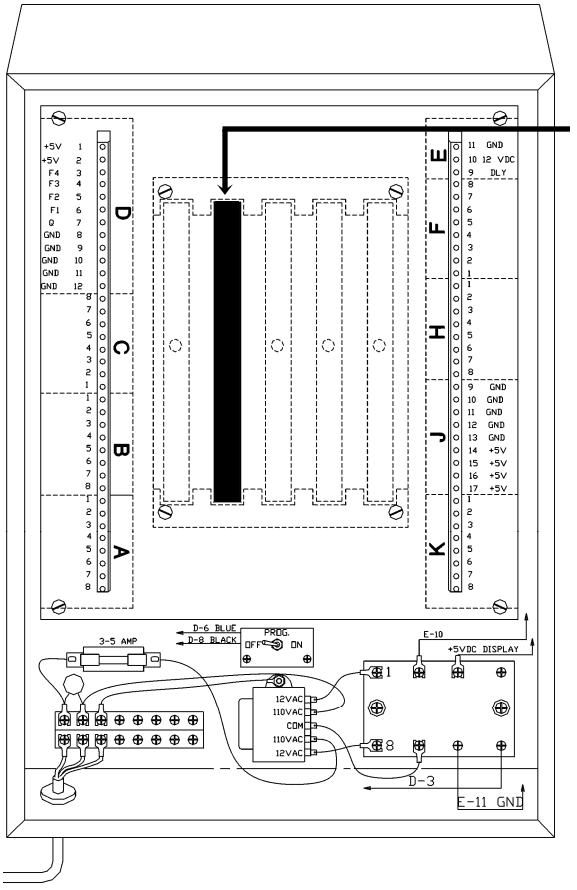
2) Open gray box and remove lid from inner black box.

3) Slide 101 E-Prom Card into empty slot (empty slot should be located between the 100 & 102 cards). The 101 card is keyed and will only go in one way, **DO NOT FORCE.**

4) After 101 E-Prom Card has been inserted and the processor has been un-plugged for at least 10-seconds, reconnect power supply to processor. A full set of numbers should appear on the display board (10012, 41234, etc...). If only a single number shows, disconnect power wait 10-seconds then reconnect power. Keep disconnecting and reconnecting power until you get a full set of numbers on the display panel.

5) After numbers appear, press the “DISPLAY” button then the “RUN” button and finally the “CAGE” button. The display panel should read “10000”.

6) Disconnect power from processor and remove the 101 E-Prom Card. You are now ready to reprogram for your specific ball and coin amounts. Refer to “PROGRAMMING BALL AND COIN COUNTS” on page 16.



DAILY OPERATIONAL FORMS & CHECKLISTS

Pages 59 thru 68

BATTING RANGE DAILY REPORT

DAY SUPER:	DATE:
NIGHT SUPER:	DATE:
TIME IN: TIME IN:	TIME OUT: TIME OUT:

MICROPROCESSOR READINGS

CAGE NO.	CLOSING DISPLAY READINGS	OPENING DISPLAY READINGS	TOTAL PLAYS
1			
2			
3			
4			
5			
6			
7			
8			
9			
RENTAL TIME	**CLOSING RENTAL READINGS**	**OPENING RENTAL READINGS**	**TOTAL PLAYS**
15 min.			
30 min.			
45 min.			
60 min.			
90 min.			
50 balls			
100 balls			
150 balls			
250 balls			
Manl.			
BILL CHANGER	**CLOSING READINGS**	**OPENING READINGS**	**TOTAL AMOUNT**
$ 1.00			
$ 5.00			
$10.00			
$20.00			

WEATHER INFORMATION
APPROX. HIGH:
APPROX. LOW:
COMMENTS:

COUPONS / FREE GAME
1 -FREE TOKEN:
2 - FREE TOKENS:
5 - FREE TOKENS:
GIFT CERTIFICATE:

CHECK	DAILY CHECKLIST DATE_____/_____/_____	INSPECTED BY:
	Clean debris from batting area (pit, stalls, etc…)	
	Visually inspect the coin box for damage and repair as necessary.	
	Visually inspect batters stalls for any holes in netting, properly hung backstop pads, well marked batters boxes, verify gates have return springs attached and that the gates fully close. Repair if necessary.	
	Walk the inside perimeter of the cage visually checking for ripped netting ties at lower fence, holes in net (including overhead), broken cables, and fencing connections.	
	Visually check pitching machine area (the pit) for netting holes, rips in netting tie downs, etc. Repair if needed.	
	Visually check where balls are pitching through the Netting Holes. Balls must pass through the middle of the holes (not closer to any edge of hole). Make adjustments to net holes as needed. Refer to page 44.	
	Visually check light box warning lights for proper operation. Replace any broken lens or	
	Visually check 90 degree drop for proper alignment with ball chute. Check proper spacing between ball drop from 90 degree drop and top of ball chute. Proper spacing is 3.5 inches of drop for baseball and 4.5 inches of drop for softball. Adjust as necessary. Refer to page 42.	
	Visually inspect ball chutes and ball guide chutes for proper alignment.	
	Visually inspect pinch roller wheel for damage or wear. Replace if necessary.	
	Visually inspect pitching wheels for damage or wear. Replace if necessary.	
	Visually check guide chute “micro switch” cord from light box for proper attachment. Be certain that each wire lead has a properly attached crimp-on “fork terminal” and that it is firmly connected to the micro switch leads. Replace “wire ties” that attach micro switch wire to ball guide chute if broken.	
	Manually feed balls through pitching machine and watch carefully for accurate pitches and make adjustments as necessary. Drop a token in each coin box and count the number of pitches to assure micro switch is counting correctly. Check for proper sequencing of light box. Section of Trouble Shooting Guide pages 27-29	
	Turn on hopper/feeding system and observe its operation.	
	Visually check underneath fiberglass shroud at the bottom of the conveyor system before the machines have been turned on for any debris that could block the conveyor.	
	Visually check bats for cracks and worn out grips. Replace as needed.	
	Visually check all batting helmets for cracks or defects. All helmets must have protective face	
	Visually check balls for excessive or uneven wear, cracks or breaks. Replace as needed. Remember, never mix old balls with new balls. Replace balls all at one time to assure consistent ball wear.	

MUST BE COMPLETED DAILY.
SAVE THIS FORM FOR FUTURE REFERENCE

DAILY OPERATIONAL FORMS & CHECKLISTS

DECK DUTIES CHECKLIST **DATE:**

TIMES	Check all Gabage Cans	Check Parking Lot	Litter & Light Patrol on Mini Golf	Inspect Pit Area	Check Loose Wire, Balls etc...	Arcade Inspection	Check Restrooms	Inspected By:
10:00am								
10:30am								
11:00am								
11:30am								
12:00pm								
12:30pm								
1:00pm								
1:30pm								
2:00pm								
2:30pm								
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11:00pm								
11:30pm								
12:00pm								

DAILY OPENING DUTIES

DUTIES	ASSIGNED TO	CHECK OFF	SUPERVISOR GRADE
SWEEP - Golf courses, (all trash and cigarette butts) Proshop areas, deck area, parking lot, breezeway and ice cream area.			
LITTER PATROL - Entire facility			
PUT UMBRELLAS UP			
SET-UP PITCHING MACHINES			
CHECK NETTING & REPAIR HOLES			
CHECK CONVEYOR & SHROUD SO NOTHING IS BLOCKING CONVEYOR			
CHECK HOPPERS TO MAKE SURE THERE ARE NO FOREIGN OBJECTS IN IT			
MAKE SURE CORDS ON PITCHING MACHINES DON'T BLOCK BALLS COMING DOWN			
CHECK WIRE TIES ON ALL CORDS COMING FROM LIGHT BOXES			
CHECK WHEELS ON PITCHING MACHINES			
CHECK RESTROOMS SUPPLIES			
MAKE SURE THERE ARE ENOUGH BATTING TOKENS IN PROSHOP			

SERVICE DEPARTMENT BATTING CAGE CHECKLIST

LOCATION:	MECHANICS:	DATE:
MANAGER ON DUTY:	EVALUATOR:	TIME:

CAGES MUST BE MAINTAINED PER CAGE SERVICE MANUAL
PLEASE BE SPECIFIC ABOUT DEFICIENT AREAS

SAFETY

CAGE DOORS:	**ALL NETTING**
BACK MAT:	**BATTER'S BOX:**

GENERAL CONDITION

PLEASE USE THE LETTER THAT CORRESPONDS WITH THE DEFICIENT AREAS.	BALL CONDITION & QUANTITY
A. WHEELS B. BELTS C. GUIDE CHUTE D. FEED TUBE ALIGNMENT E. HOPPER ASSEMBLY F. AIM OF BALL G. PINCH ROLLER H. WIRING I. BEARING J. AMBER/RED WARNING LIGHTS K. CAGE LIGHTING	COIN BOXES CLEANLINESS OF CAGES

PITCHING MACHINE

#1	**#6**
#2	**#7**
#3	**#8**
#4	**#9**
#5	**MISC.**

TEAM RENTAL INFORMATION

DATE:	**TIME:**
TEAM NAME:	**COACHES NAME:** **PHONE NUMBER:**
TYPE OF MACHINE:	**SPEED OF MACHINE:**

TIME	BASEBALL	SOFTBALL	VIDEO TAPE
9:00 9:30			
10:00 10:30			
11:00 11:30			
12:00 12:30			
1:00 1:30			
2:00 2:30			
3:00 3:30			
4:00 4:30			
5:00 5:30			
6:00 6:30			
7:00 7:30			
8:00 8:30			
9:00 9:30			
10:00 10:30			

COMMENTS:

TEAM RENTAL INFORMATION	
TEAM NAME:	CLASS:
CITY OF LEAGUE:	BASEBALL: SOFTBALL:
AGE GROUP:	YEARS TOGETHER:
HEAD COACH:	PHONE #:
ADDRESS:	CITY: ZIP:
ASSISTANT COACH:	PHONE #:
ADDRESS:	CITY: ZIP:
START OF LEAGUE:	END OF LEAGUE:

DATE/TIME 15 MIN. RENTAL	DATE/TIME 1/2 HR. RENTAL	DATE/TIME 1 HR. RENTAL

COMMENTS:

PROSHOP DAILY REPORT

DAY SUPER:	DATE:
NIGHT SUPER:	DATE:

TOTAL TRANSACTION	CASH TRANSACTION	CREDIT TRANSACTION	SALE TAX RECONCILIATION	TODAY'S TOTAL RECEIPTS
Ending Invoice #: Starting Invoice #: # of Voided Invoices:	Ending Cash: Starting Cash: Today's Cash Receipts:	No. of Transactions: Today's Total Credit Receipts:	Total Proshop Receipts: 7% x above Total: Difference = Total of Sales Tax on all Invoices:	Cash Receipts: Credit Transactions: Receivables paid today: Today's Total Receipts:

RETURNS

INV. #	MODEL # DESRIPT. OF ITEM	REASON FOR RETURN	MODE OF REFUND	SIG. OF SUPERVISOR

RECEIVABLES RECEIVED TODAY

INVOICE #	DATE OF INVOICE	AMOUNT PAID	BALANCE DUE

BE SURE TO MAKE APPROPRIATE INVENTORY ADJUSTMENTS

CASH REFUNDS: Note below if any money had to be drawn from another source other than Proshop cash drawer.

DEFECTIVE EQUIPMENT RETURNS

INVOICE #	MODEL # & DESCRIPT. OF ITEM	DEFECTIVE PART	EQUIPMENT REPLACED	RECEIPT GIVEN PENDING MANU-FACT.	BILL DUE

BE SURE TO MAKE INVENTORY ADJUSTMENTS IF EQUIPMENT IS REPLACED.

HOUSE CHARGES TODAY

INVOICE #	TOTAL INVOICE AMOUNT	DOWN PAYMENT IF ANY	BALANCE DUE	NAME OF CUSTOMER OR ACCOUNT

Do not include any partial payments. Any partial payments should be put into envelope with account name on it. Keep envelope in appropriate area of safe until account has been paid in full. On the day the account is paid in full, credit the receivables section of that days report.

FAX YOUR ORDER

CHECK ONE ONLY

UPS REGULAR	UPS 3RD DAY	UPS BLUE	UPS RED	UPS RED SATURDAY

QUANTITY	PART NUMBER	DESCRIPTION

SOLD TO:
NAME:
PHONE #:
P.O. #:

SHIP TO:
NAME:
PHONE #:
P.O. #:

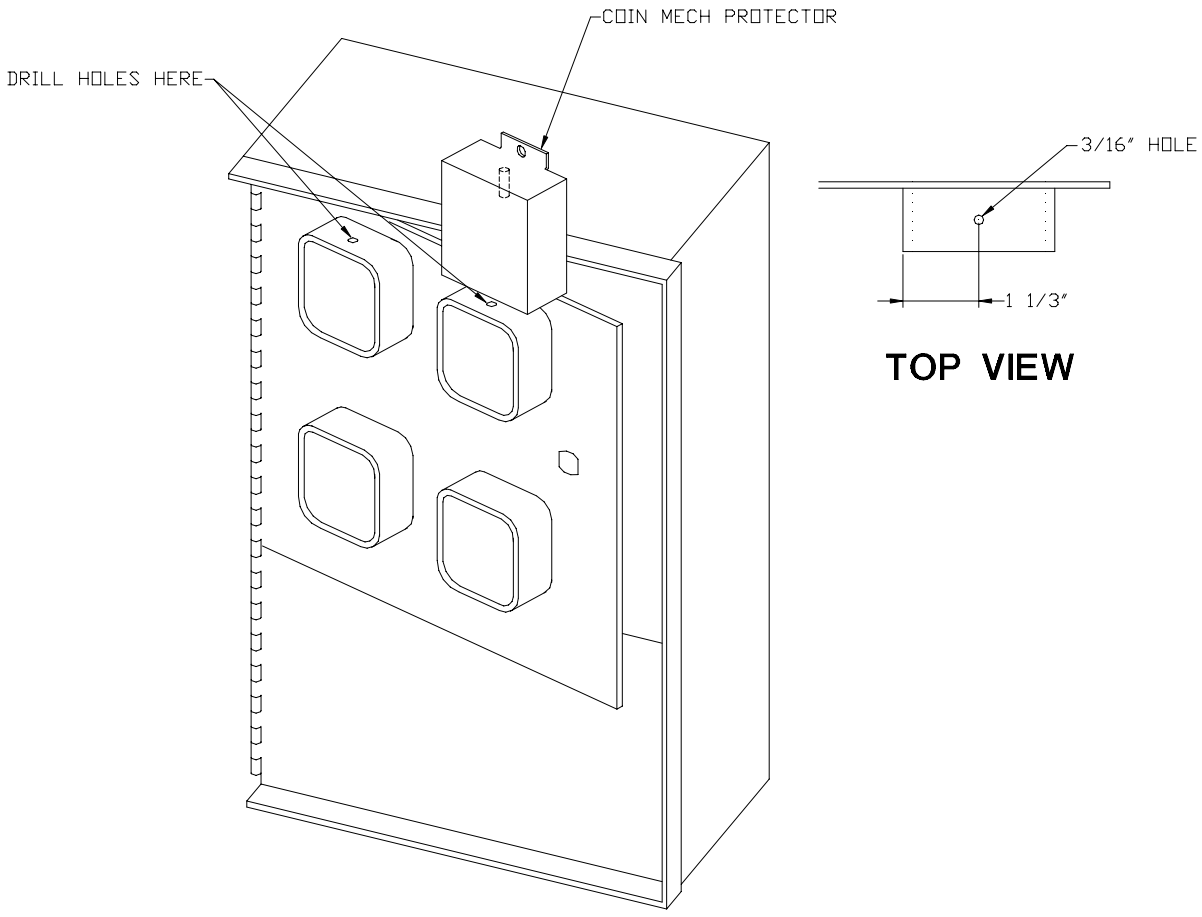
SPECIAL INSTRUCTIONS:

OPERATION OF BALL DRYERS

Pages 69 thru 73

DUAL MACHINE COIN BOX LOCK-OUT COVER

In most cases, only one of the machines in a dual machine system will have a ball dryer installed. The coin mechanism for the machine **without the ball dryer** must be disabled to prevent the customer from activating that machine. ABC will provide a **Coin Box Lock Out Cover.** When installed, this cover will effectively prevent the customer from dropping a token in that mechanism. A simple modification will be required for coin boxes purchased prior to 1995. Refer to drawing 95-C shown below for installation of cover or modification of coin box.



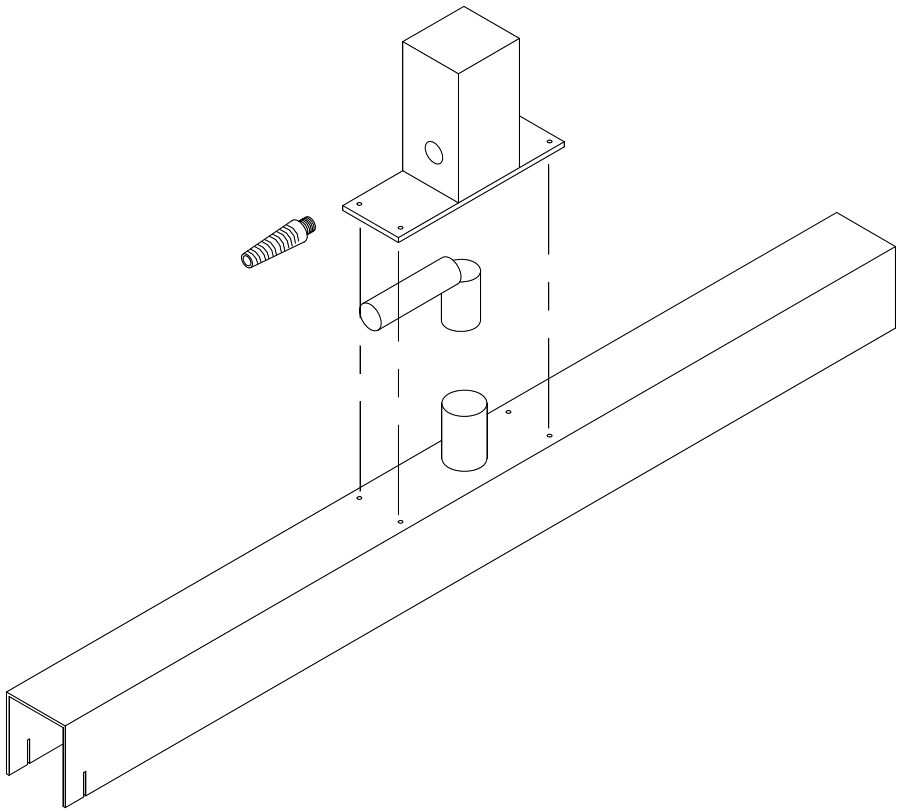
95-C

BALL DRYING SYSTEM

Operation of the ball drying system requires one dryer mounted in the baseball hopper and one dryer mounted in the softball hopper. It also requires a ball dryer assembly mounted on each machine trough**. For customer safety, ABC does not recommend operating the fast or very fast baseball or softball machines during wet conditions.**

OPERATING YOUR BALL DRYING SYSTEM

The ball drying system should be used any time you attempt to operate during wet conditions. **For effective drying of balls, the operator must insure that the feed troughs remain full of balls at all times.** This will prevent a wet ball from rolling directly down to the pinch roller without spending the correct amount of time in the drying chamber. The ball dryers have a low and high setting. In most cases, the low setting will effectively dry the balls. The high heat setting should be used if you are experiencing very wet conditions or any time the balls are not being completely dried. Conditions can vary at each location, so the operator must determine which setting will be required. If your dryers are running constantly and no game has been played within 5 to 10 minutes, it is recommended that a manual game be activated so that the heated balls in the chamber are completely replaced by unheated balls. This will improve the accuracy of pitches on the next game played. Overly heated balls will become soft and affect the pitch. If you have any questions regarding the use of the ball drying system, please contact ABC's Customer Service Department at 1-800-578-2243.



AUTOMATIC BALL DRYING SYSTEM

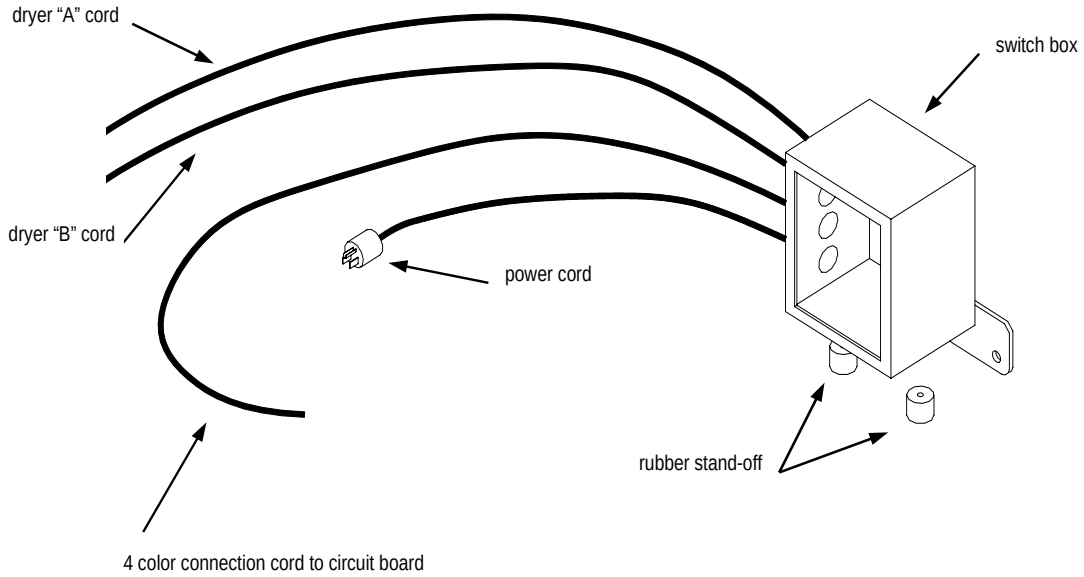
Ball Drying Single/Dual Switching System. This system when plugged in allows the ball dryers to automatically turn on & off with the pinch roller motors. If you have purchased the Dual Switching System, you may operate a ball dryer on both machines of a dual system. Since the switching will allow only one system at a time to run, one 20amp electrical circuit can be used for both dryers. By switching the systems on & off, the balls are effectively dried, excessive heating is eliminated and you will experience an energy savings.

SAFETY INFORMATION

For your safety and the safety of others, pay special attention to these precautions.

- Equipment maintenance should only be performed by qualified persons with a full understanding of the equipment and how it operates. It is also very important that the person maintaining the equipment understands about the batting range operation and risks involved with repairing and maintaining the system.
- **CAUTION:** disconnect power cord from electrical outlet *BEFORE* servicing warning light box.
- Always wear protective eyewear.
- Only work on light box before operating hours.
- Do not remove any guards, labels, shields, covers or safety devices; they are installed for your safety.
- Before reconnecting power cord, make sure that all electrical connections are properly secured.

COMPONENT IDENTIFICATION



INSTALLATION OF SWITCH BOX

WARNING! Disconnect power from electrical outlet ***BEFORE*** servicing warning light box.

1 Mount the switch box on light box. Use the existing lens guard bolts to mount front of switch box, refer to diagram A.
2 Drill one 7/8" diameter hole in the light box as shown in diagram C.
3 Now mount the "black" O-Flex strain relief just like the existing strain relief on the light box.
5 Now its time for the finishing connections. NOTE: If you already have ball dryers and are upgrading, you need to take the existing power cord off the ball dryers. Take the wire marked dryer "A" cord, (as shown in diagram C page 6) and connect to dryer cord located in 2x4 junction box via wire nuts. If you have dual machines, make sure you connect dryer "A" cord to baseball and dryer "B" cord to softball. If you have any question call ABC.At this time you will make the final connections, take the wire marked (as shown in diagram C) 4 color connection cord to circuit board, slide cord through "black" O-Flex strain relief and pull wire as needed so that you can make your connections at the bottom of the circuit board. Next take a screw driver and terminate the connections as follows;

5a) **Single Machine** connect the black wire to feed A, white wire to area marked white and green wire to ground lug.

5b) **Dual Machine** - connect the black wire to feed A, red wire to feed B, white wire to area marked white and green wire to ground lug.

6 You now are finished! The power cord should only be plugged in when it starts raining, and unplugged when the hitting surface is dry.

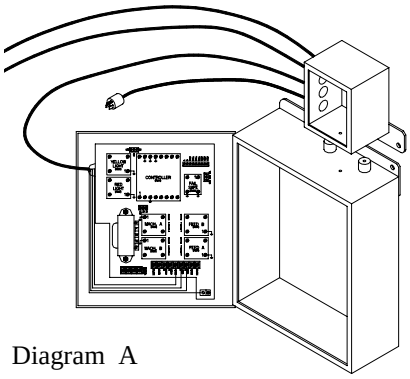


Diagram A

4 color connection cord to circuit board

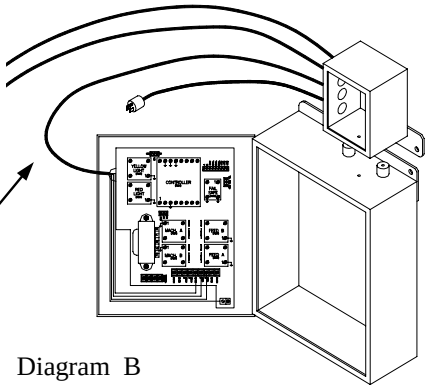


Diagram B

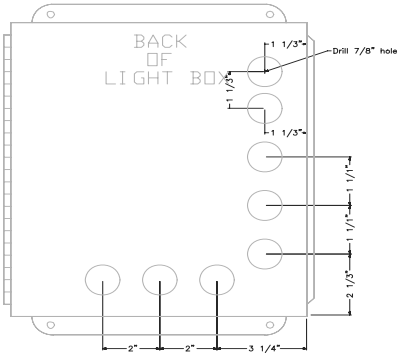


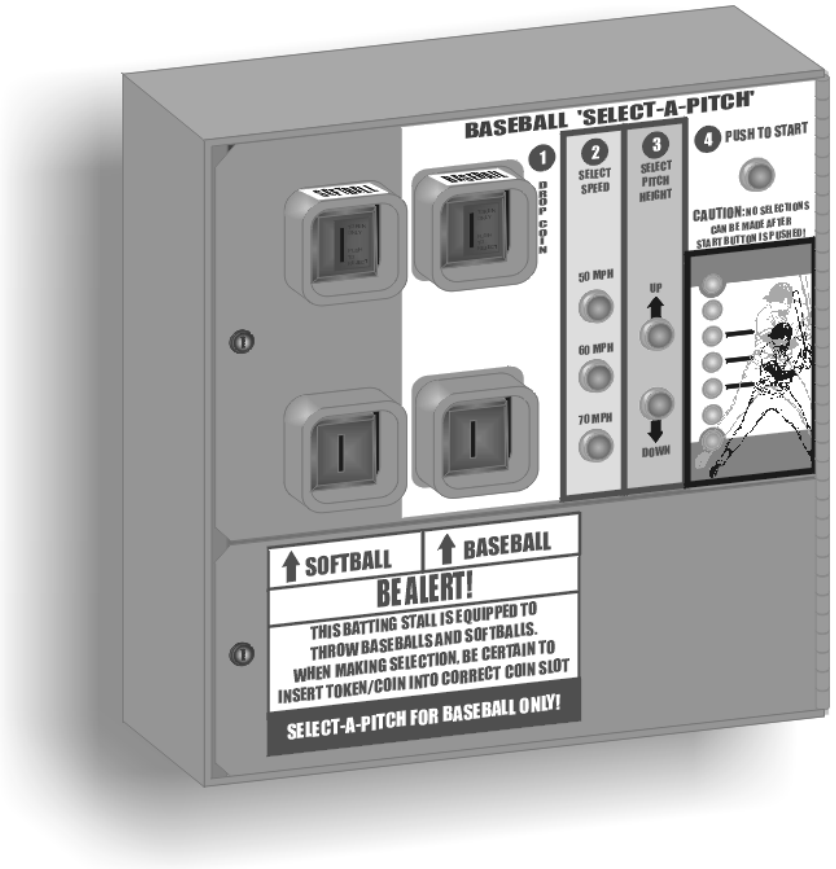
Diagram C

SELECT-A-PITCH SYSTEM

Pages 74 thru 89

SELECT-A-PITCH DESCRIPTION

The ***Select-A-Pitch*** System allows the customer to select from three different speeds, and then independently select the best height setting for that individual. This is achieved with a specially designed and modified pitching machine, and an assembly of electronics located in a modified coin box, a left hand hitter height control box, light box, and Master Office Control Panel. There are two speed programs or "windows" that can be preset into the system. The **"Slow"** program will allow pitching speeds of **40, 50,** and **60 MPH**. The **"Fast"** program will allow pitching speeds of **50, 60**, and **70 MPH.**


BASEBALL 'SELECT-A-PITCH'
1 DROP COIN
2 SELECT SPEED
3 SELECT PITCH HEIGHT
4 PUSH TO START
CAUTION: NO SELECTIONS CAN BE MADE AFTER START BUTTON IS PUSHED!
50 MPH
60 MPH
70 MPH
UP
DOWN
SOFTBALL
BASEBALL
BE ALERT!
THIS BATTING STALL IS EQUIPPED TO THROW BASEBALLS AND SOFTBALLS. WHEN MAKING SELECTION, BE CERTAIN TO INSERT TOKEN/COIN INTO CORRECT COIN SLOT
SELECT-A-PITCH FOR BASEBALL ONLY!

REGULAR MAINTENANCE PROCEDURES

DAILY MAINTENANCE SCHEDULE

DAILY START UP PROCEDURE

1) Activate game by dropping coin into baseball coin slot
2) Select center speed
3) Adjust height indicator light to the center position
4) Press "Start". If balls are pitching at desired height, the machine is programmed properly.

Note: If machines are not throwing at the desired height , unplug PT-4 light box from power and then reconnect. Proceed with the above steps (1 thru 4) to verify machine is pitching at desired height. If pitches are still not accurate, adjust system using the 4 steps listed in the "Final Programming Procedures" (pg. 104).

WEEKLY MAINTENANCE

- Lubricate threaded output shaft on both "Speed" and "Height" adjustment motors.
- Check for any loose fasteners, fittings, or electrical connections on adjustment motor assemblies.
- Inspect machine drive belt for cracks or tears. Replace as needed.
- Refer to "Maintenance" section in Owners Manual for all other maintenance.

IF YOU HAVE ANY QUESTIONS REGARDING SELECT-A-PITCH MAINTENANCE OR OPERATION PROCEDURES, CALL ABC AT 1-800-578-2243.

SELECT-A-PITCH CONTROL BOX
PROGRAMMING LEGEND

When programming:

a) Buttons are referred to by number.

b) Legend indicates number assigned to each button.

SELECT-A-PITCH
MECHANICAL INITIALIZATION PROCEDURE

This procedure must be performed when the system is first installed or if a new elevation motor assembly is installed on the pitching machine.

1) Connect light box and Master Office Control Panel to power (115VAC).

2) The mechanical initialization must be performed using the speed program that the machine will be operated at. "Slow" program (40, 50, 60 MPH) or "Fast" program (50, 60, 70 MPH). Any custom speed adjustments must be performed after step 5.

3) Enter the factory speed preset. Press ***"Program Switch"* 4, 5, 1** for "Slow" program or ***"Program Switch" 4, 5, 2*** for "Fast" program.

4) Enter factory elevation preset by pressing ***Program Switch 4, 5, 3*** and then ***Program Switch 4, 2, 6*** to save.

5) Cycle A/C power. Unplug light box from power (115VAC) and reconnect. Elevation motor will move backwards to stops and then reverse and move forward 10 revolutions.

6) OPTIONAL : Adjust custom speeds at this stage if necessary.

7) Start game at coin panel and select **center** speed. LED will be at center position. Push ***"Start"*** button and observe pitch height. **Pitches must be at adult waist level.** If pitch is too low you must move locking collar (on elevation motor shaft) back towards motor. If pitch is too high you must move locking collar forward (away from motor). After every adjustment you must unplug the light box and then plug it back in. This allows the elevation motor to relocate itself. Continue to make locking collar adjustments until pitches are at the adult waist level.

8) Once the pitches are within this range press ***Program Switch 4, 6, 1***, then ***Program Switch 4, 6, 2*** , then ***Program Switch 4, 6, 3***.

9) Press ***"Program Switch"* 5, 1**

10) Press ***"Program Switch" 5, 3*** to activate game. Select center speed and press ***"Start".*** Confirm that ball is being pitched at adult waist height and LED is in center position. If not, mechanical initialization procedure must be repeated.

11) Press ***"Program Switch" 5, 1*** to stop game. Mechanical initialization is complete. You may now proceed to the Final Programming Procedure.

SELECT-A-PITCH

FINAL PROGRAMMING PROCEDURE

These programming steps are to be performed after the mechanical initialization is complete. You will also use these simple programming steps to correct minor errors or glitches that may occur during normal operation of the Select-A-Pitch System. See Select-A-Pitch Troubleshooting section for assistance.

1) Press ***"Program Switch" 5, 3*** to activate game. Select **"Slow"** speed and push **"Start".** Adjust height of pitch to adult waist level by using **"Up/Down"** buttons only. **Do not adjust height in program mode.**

2) Press ***"Program Switch" 4, 6***. Using **"Up/Down"** buttons, move LED to center position. Press switch # 1 to save.

3) Press "***Program Switch" 5, 3*** to activate game. Select **"Fast"** speed and push **"Start".** Adjust height of pitch to adult waist level by using **"Up/Down"** buttons only. **Do not adjust height in program mode.**

4) Press ***"Program Switch" 4, 6***. Using **"Up/Down"** buttons, move LED to center position. Press switch # 3 to save.

TROUBLESHOOTING SUGGESTIONS

Troubleshooting problems with the Select-A-Pitch system will require an understanding of how the system operates. Review the "Power Flow" charts, which indicate the voltage that the different color wires will carry, component drawings for location of voltage, LED indicator lights which shows if voltage is present, and the "Sequence of Operation". It is very important to observe the sequence of operation and take note of what is not happening or what is out of sequence. This will enable you to understand how the system works and direct you to the specific problem area. Using the various charts will enable you to check for proper voltage at specific locations. When proper voltages are present, a defective component is likely. If proper voltage is not present, trace the power flow back until you locate the origin of voltage loss. Please call ABC Customer Service with your results or if you require any assistance.

MECHANICAL INITIALIZATION AND FINAL PROGRAMMING ABBREVIATED

Please refer to complete instructions for detailed explanation of mechanical initialization procedure.

1) Connect light box and Master Office Control Panel to power (115VAC)

2) Enter speed program (Choose one): Pgm. 451 (40, 50, 60 MPH)
Pgm. 452 (50, 60, 70 MPH)

3) Enter elevation preset: Pgm. 453 and then Pgm. 426 to save.

4) Unplug light box from A/C power and reconnect.

5) Start game, select *center* speed. *Pitches to be at adult waist level*. If not, stop game, adjust locking collars in appropriate direction until waist height pitch is achieved. *Cycle A/C power at light box after every collar adjustment.*

6) Enter Pgm. 461, Pgm. 462, Pgm. 463

7) Enter Pgm. 51

8) Enter Pgm. 53 to activate game. Select center speed and push "Start". Verify that balls are pitching at adult waist height.

9) Enter Pgm. 51 to stop game.

10) Enter Pgm. 53 to activate game.

11) Select "Slow" speed and push "Start". Using "Up/Down" buttons only, adjust pitches to waist level. Do not use program button or mode to raise or lower.

12) Enter Pgm. 46. Use "Up/Down" buttons to move LED to center position. Press 1 to save.

13) Enter Pgm. 53 to activate game.

14) Select "Fast Speed" and push "Start". Using "Up/Down" buttons only, adjust pitches to waist level. Do not use program button or mode to raise or lower.

15) Enter Pgm. 46. Use "Up/Down" buttons to move LED to center position. Press 3 to save.

SELECT-A-PITCH SYSTEM SEQUENCE OF OPERATION

1) DROP COIN

2) YELLOW WARNING LIGHT ON LIGHT BOX WILL FLASH. THE 3 "SPEED" SELECT BUTTONS WILL FLASH.

3) CUSTOMER SELECTS A SPEED

4) THE SELECTED SPEED WILL FLASH. THE "UP / DOWN" BUTTONS WILL FLASH. THE "START" BUTTON WILL FLASH. THE ELEVATION INDICATOR LIGHTS WILL DISPLAY THE LEVEL AT WHICH THE PITCH WILL BE DELIVERED.

5) ADJUST ELEVATION OF PITCH IF DESIRED HEIGHT IS DIFFERENT THAN INDICATED.

6) PUSH "START" BUTTON

7) YELLOW WARNING LIGHT WILL STOP FLASHING AND GLOW CONSTANT. RED WARNING LIGHT WILL TURN ON. SELECTED "SPEED" BUTTON, ELEVATION INDICATOR LIGHT, AND "START" BUTTON WILL BE ON.

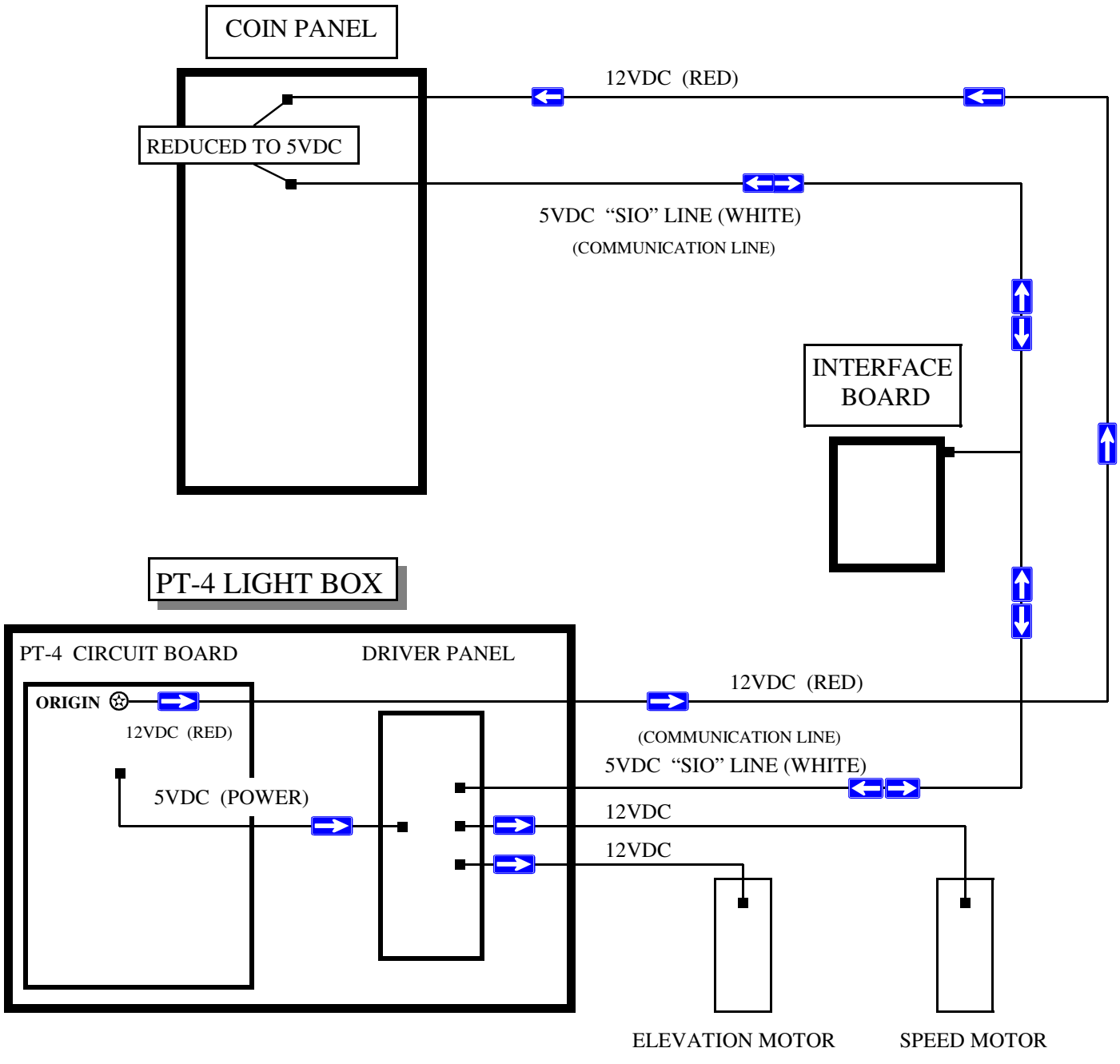
8) AFTER 10 SECOND DELAY THE MACHINE WILL BEGIN PITCHING BALLS. THE ELEVATION MAY BE ADJUSTED DURING THE GAME, BUT NOT THE SPEED.

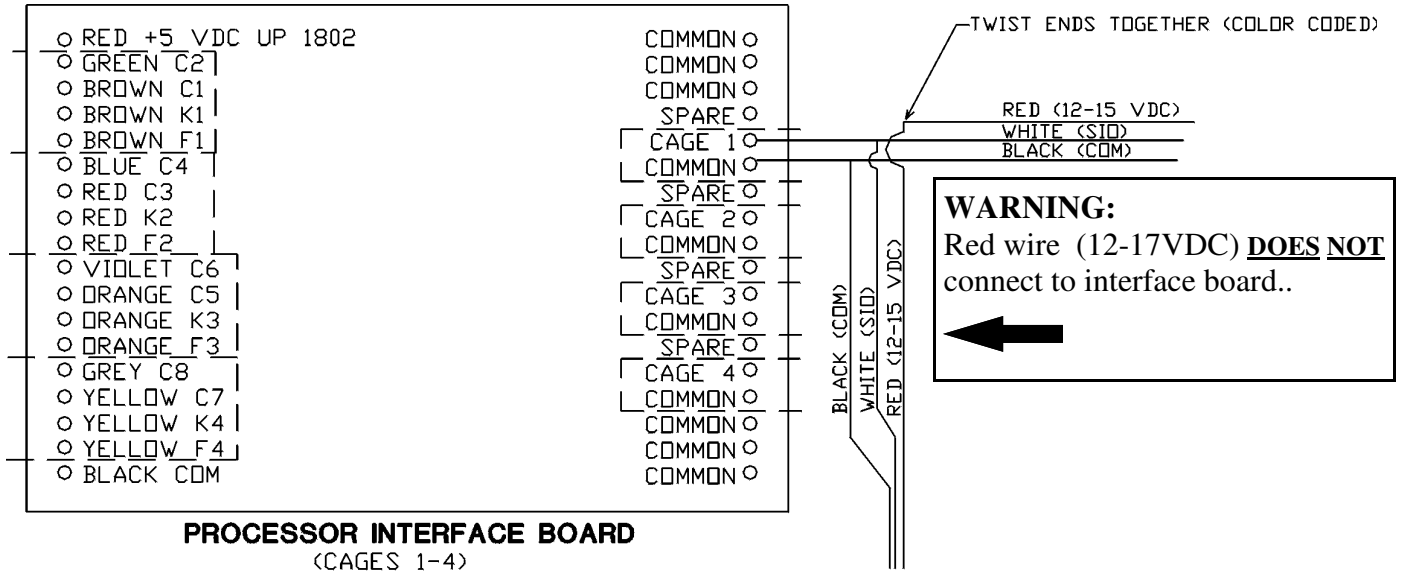
9) AFTER LAST BALL IS PITCHED GAME STOPS AND ALL LIGHTS GO OFF

NOTE

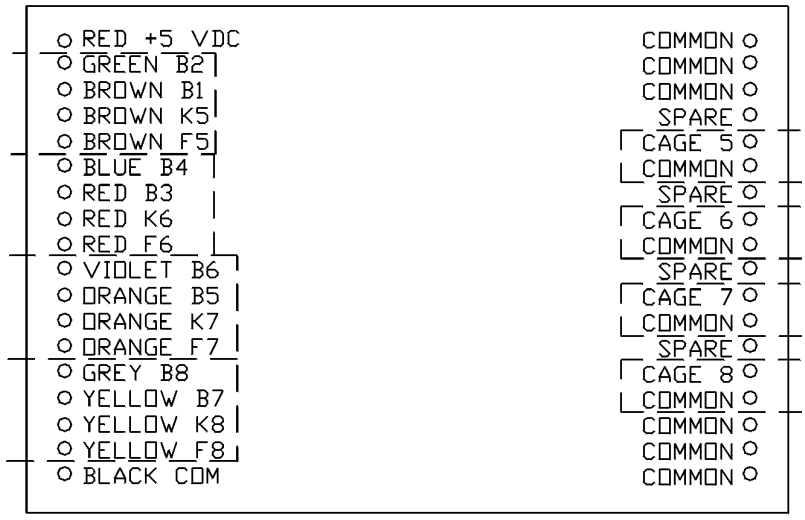
THE ELEVATION OF THE PITCHING MACHINE IS ALWAYS LEFT AT THE LAST USED SETTING. WHEN A SPEED IS SELECTED THE ELEVATION INDICATOR LIGHT WILL DISPLAY THE HEIGHT THAT THE PITCH WILL BE DELIVERED. CHANGING THE ELEVATION OF THE PITCH REQUIRES THE CUSTOMER TO MANUALLY ADJUST HEIGHT BY PRESSING THE "UP" OR "DOWN" BUTTON. ANYTIME THERE IS A CHANGE TO A DIFFERENT SPEED OR AN ELEVATION ADJUSTMENT, THE ELEVATION INDICATOR LIGHTS WILL DISPLAY THE LEVEL THAT THE BALL WILL BE PITCHED.

SELECT-A-PITCH POWER FLOW



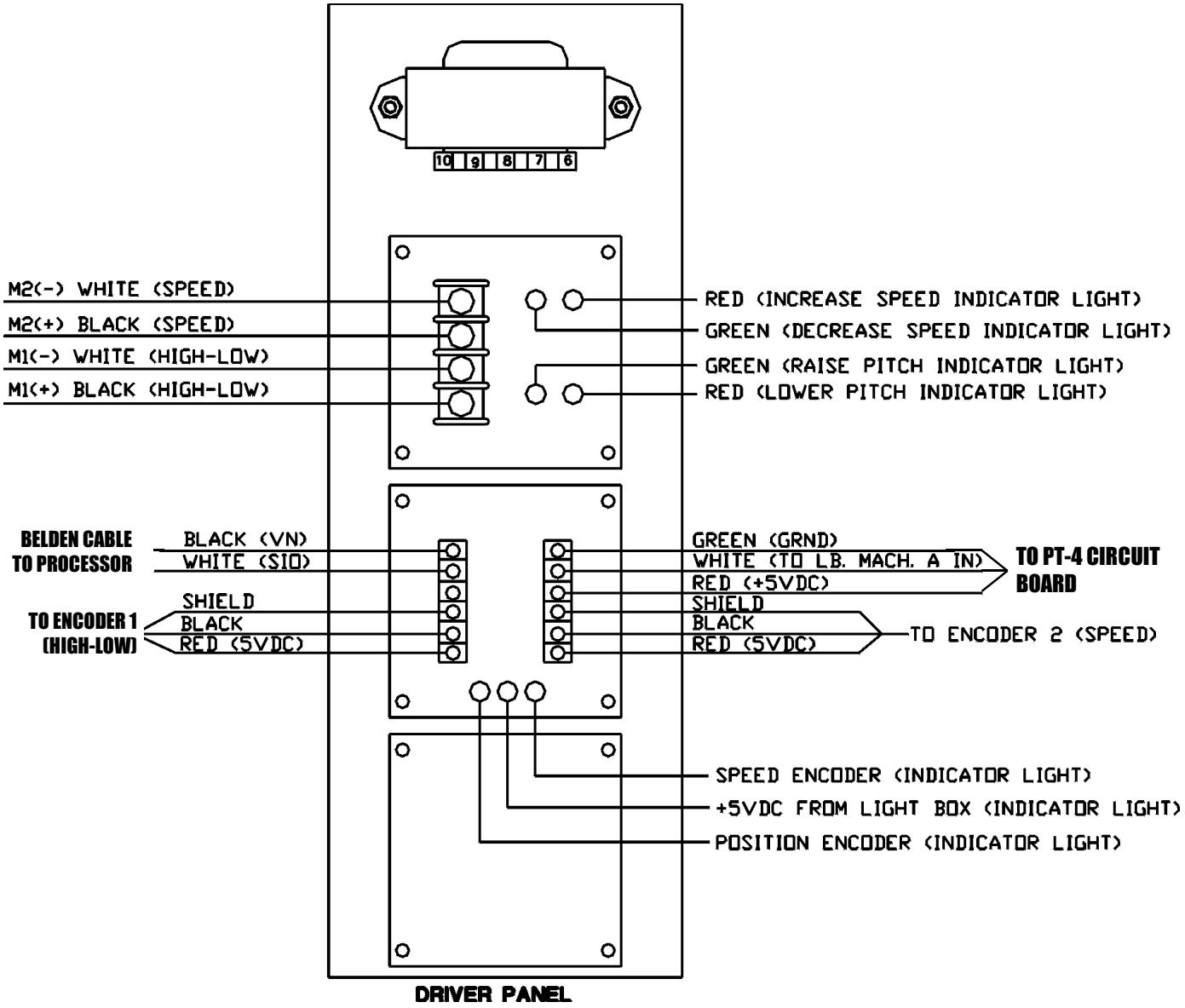


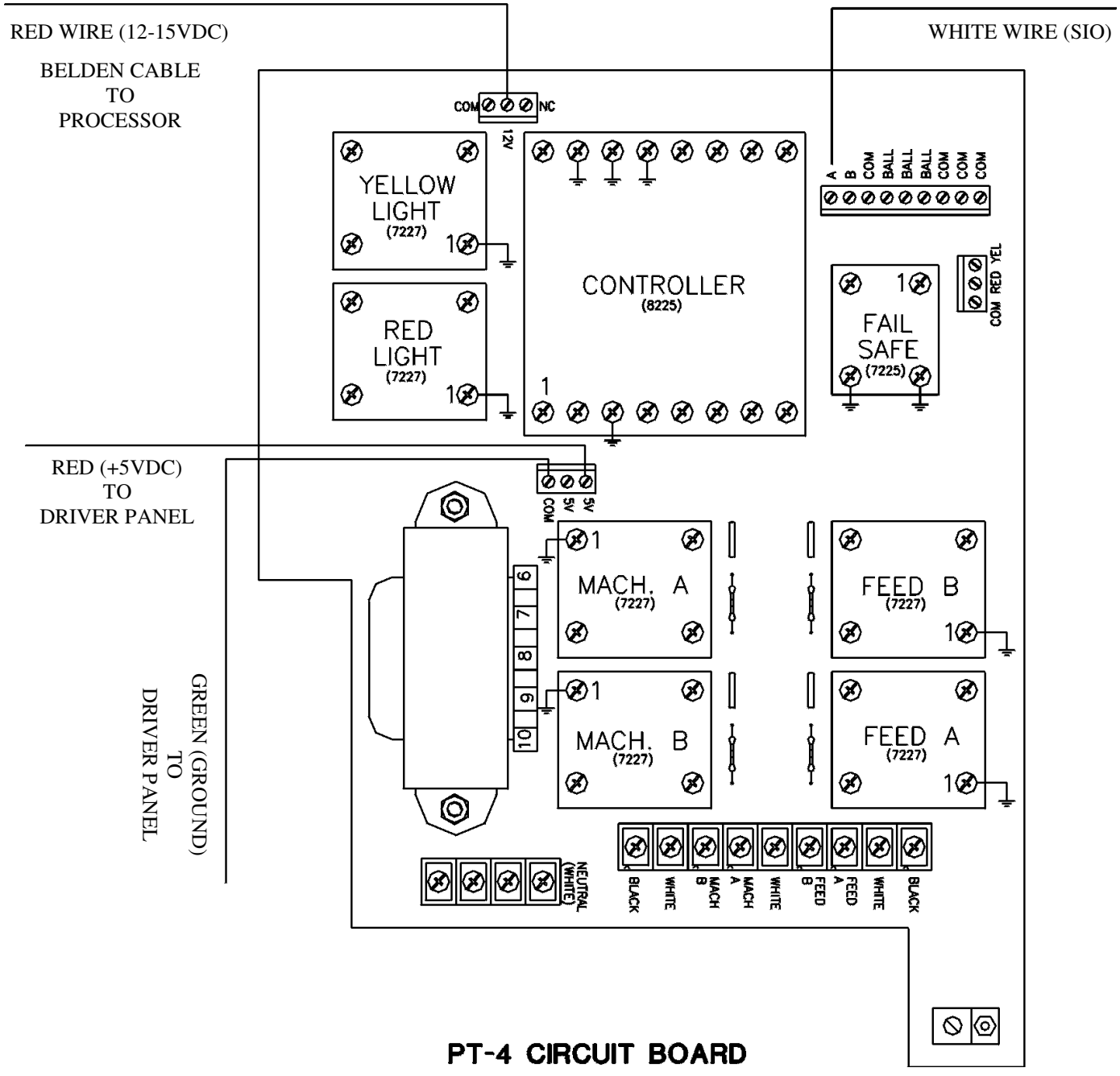
PROCESSOR INTERFACE BOARD
(CAGES 1-4)



SECONDARY INTERFACE BOARD
(CAGES 5-8)

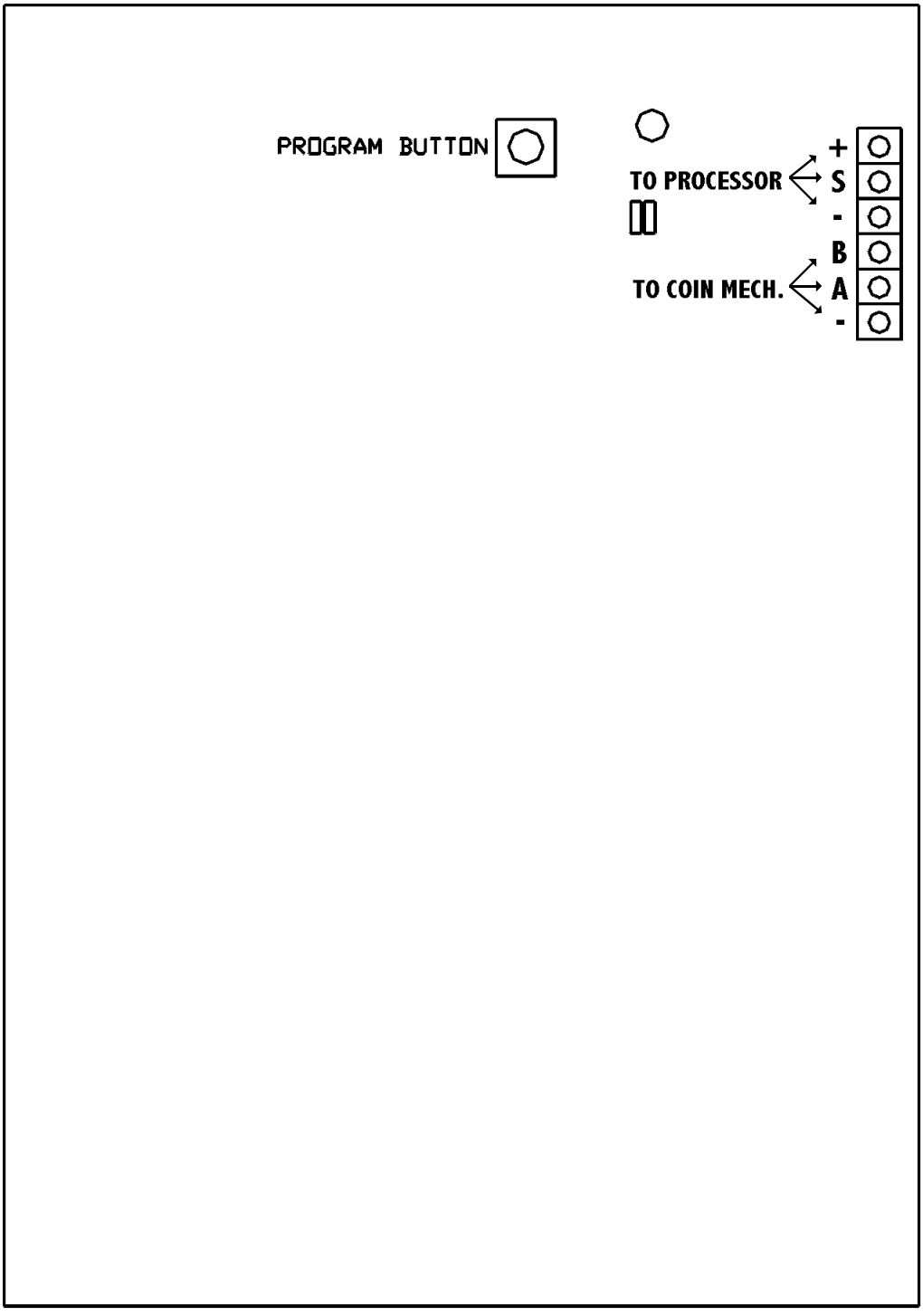
DRIVER PANEL





PT-4 CIRCUIT BOARD

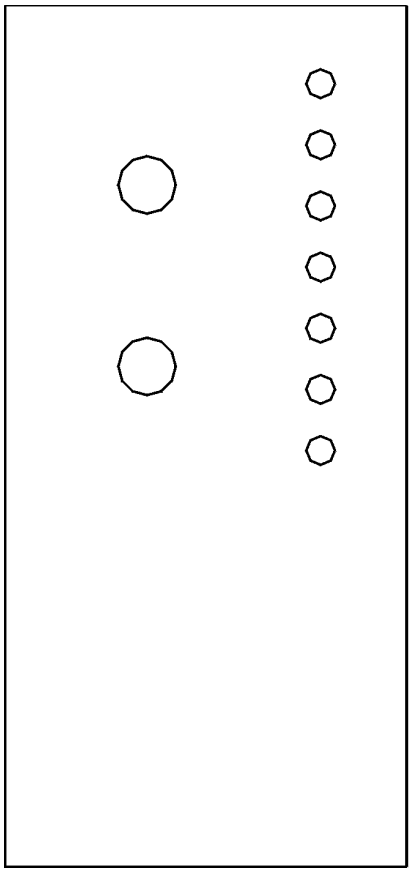
COIN PANEL



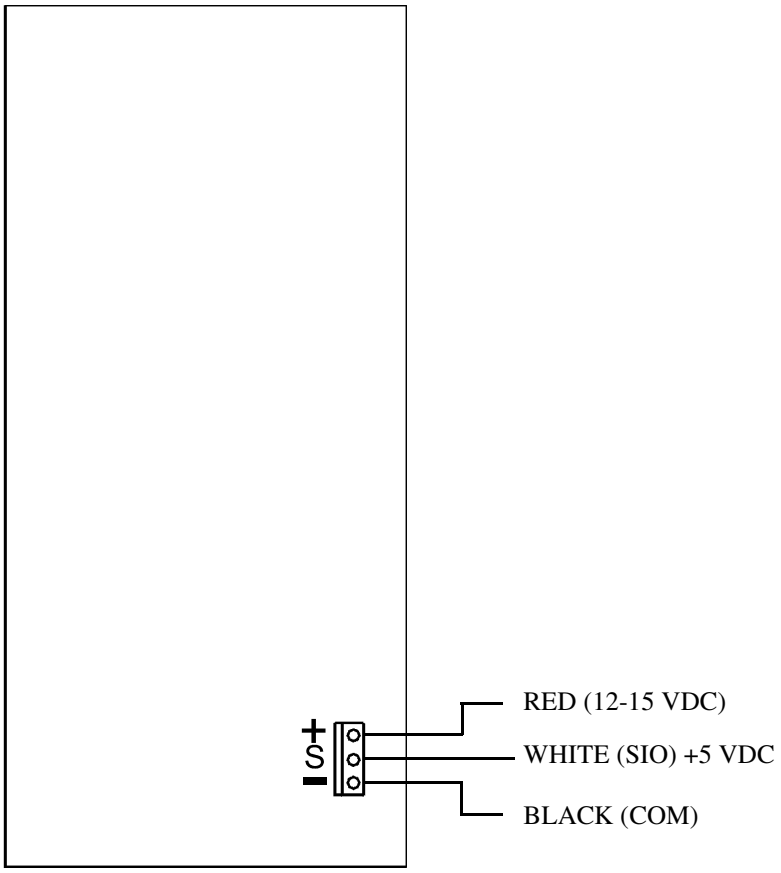
COIN BOX PANEL

REAR VIEW

LEFTY PANEL
FRONT VIEW



LEFTY PANEL
REAR VIEW



WIRING DIAGRAM
FOR LEFTY PANEL TO COIN PANEL CONNECTION

LEFTY PANEL		**COIN PANEL**
+ RED (12-15VDC) WIRE	TO	+RED (12-15VDC) WIRE
S WHITE (SIO) WIRE	TO	S WHITE (SIO) WIRE
- BLACK (COM) WIRE	TO	- BLACK (COM) WIRE

SELECT-A-PITCH
SPEED ADJUSTMENT

1) Drop token to activate game (Note: activate 2-3 games to give you enough time)

2) Select "SPEED" (Button 1,2 or 3)

40 or 50mph = 1

50 or 60mph = 2

60 or 70mph = 3

3) Push Start

4) Push "Program Switch – 5 – 6"

5) Use button #4 (⬆) to increase speed
Use button #5 (⬇) to decrease speed

6) To save setting, push the same speed button that you selected in step 2)

7) Reprogram each speed. (40-50-60) or (50-60-70) following steps 1 through 7

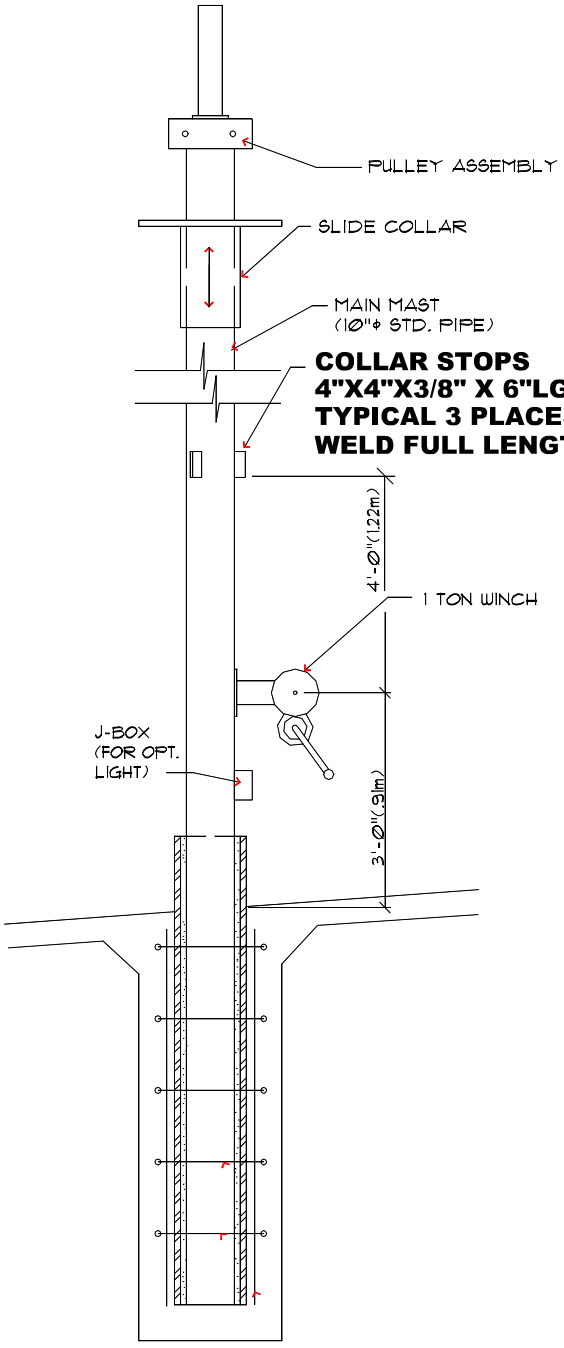
8) If height needs to be adjusted, follow Initial setup procedures on page 104 in your ABC Operation and Technical Manual.

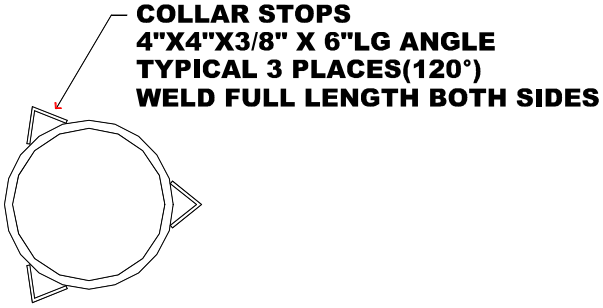
CENTER POLE WINCH & COLLAR

Pages 90 thru 113

IMPORTANT

NOTE:
ABC WILL PROVIDE "COLLAR STOPS" (4"X4"X3/8" - 6" LONG) AT NO CHARGE. CALL ABC FOR ORDERING INFORMATION.

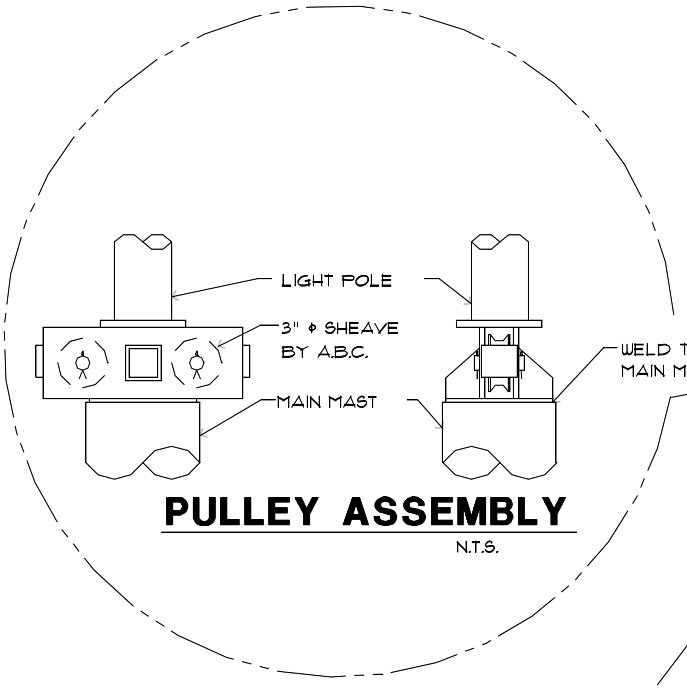




TOP VIEW

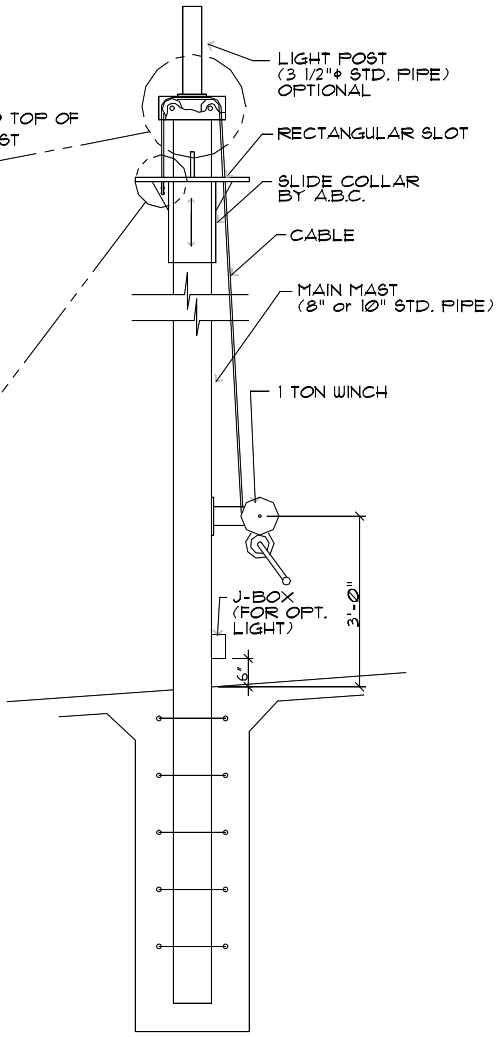
COLLAR STOPS/MAIN MAST DETAIL

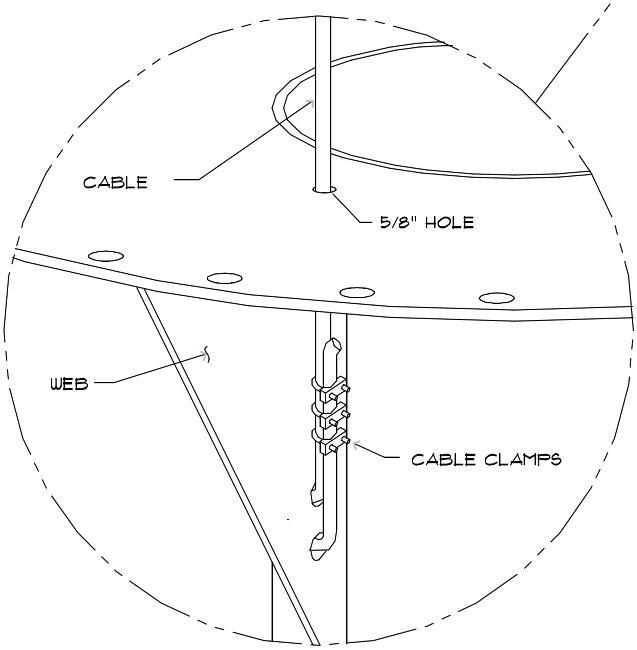
MAIN MAST MUST BE RIGGED PRIOR TO ERECTION. BE SURE TO INSTALL COLLAR, WINCH ASSEMBLY AND PULLEY ASSEMBLY. SEE NOTES BELOW FOR ATTACHMENT OF CABLE.



PULLEY ASSEMBLY

N.T.S.





NOTE:

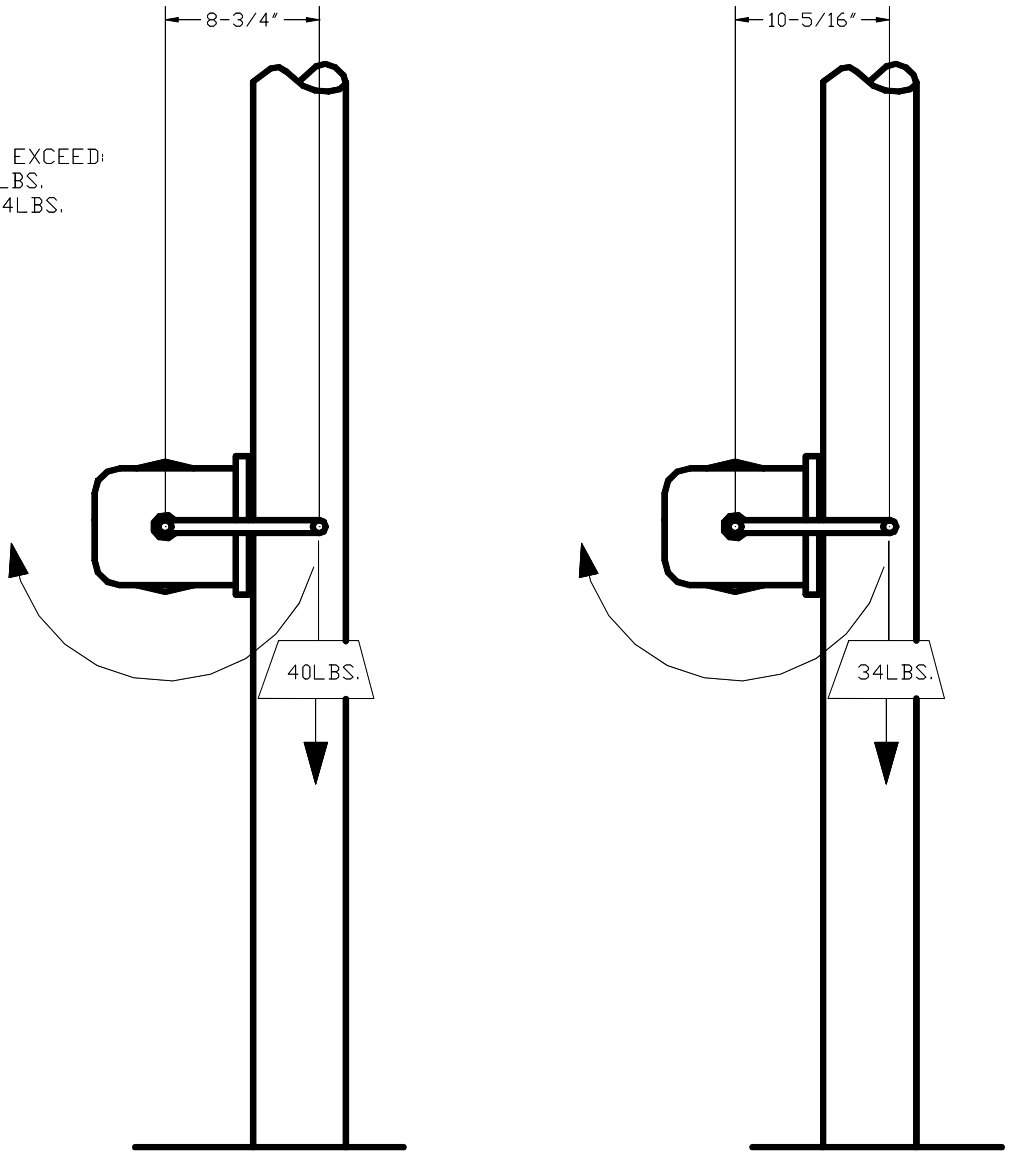
ALIGN WINCH WITH PULLEY SO CABLE GOES STRAIGHT UP MAINMAST AND THRU PULLEY ASSEMBLY.

ROUTE CABLE FROM WINCH ASSEMBLY TO MAINMAST COLLAR. FEED CABLE UP THRU THE RECTANGULAR SLOT ON THE COLLAR, THRU THE PULLEY, DOWN THRU THE 5/8" HOLE, THRU THE TWO HOLES IN THE TRIANGULAR GUSSET, AND CLAMP AS SHOWN IN DRAWING.

CABLE and WINCH DETAIL

IMPORTANT

MAX FORCE ON HANDLE NOT TO EXCEED:
HANDLE LENGTH (8-3/4") = 40LBS.
HANDLE LENGTH (10-5/16") = 34LBS.



CAUTION:
IF YOU HAVE ANY PROBLEMS DETERMINING
MAXIMUM FORCE CALL ABC FOR HELP.

THERN INCORPORATED

Owner's Manual

For The
Model M411PB
Spur Gear Hand Winch

Please record the following:

Date Purchased:

Model No.:

Code No.:

This information is required when calling the factory for service.

Two-Year Limited Warranty

Thern, Inc. warrants its products against defects in material or workmanship for two years from the date of purchase by the original using buyer, or if this date cannot be established, the date the product was sold by Thern, Inc. to the dealer. To make a claim under this warranty, contact the factory for an RGA number. The product must be returned, prepaid, directly to Thern, Inc., 5712 Industrial Park Road, Winona, Minnesota 55987. The following information must accompany the product: the RGA number, the date of purchase, the description of the claimed defect, and a complete explanation of the circumstances involved. If the product is found to be defective, it will be repaired or replaced free of charge, and Thern, Inc. will reimburse the shipping cost within the contiguous USA.

This warranty does not cover any damage due to accident, misuse, abuse, or negligence. Any alteration, repair or modification of the product outside the Thern, Inc. factory shall void this warranty. This warranty does not cover any costs for removal of our product, downtime, or any other incidental or consequential costs or damages resulting from the claimed defects. This warranty does not cover brake discs, as these are wear components and their life is subject to use conditions which vary between applications.

FACTORY AUTHORIZED REPAIR OR REPLACEMENT AS PROVIDED UNDER THIS WARRANTY IS THE EXCLUSIVE REMEDY TO THE CONSUMER. THERN, INC. SHALL NOT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES FOR BREACH OF ANY EXPRESS OR IMPLIED WARRANTY ON THIS PRODUCT. EXCEPT TO THE EXTENT PROHIBITED BY APPLICABLE LAW, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ON THIS PRODUCT IS LIMITED IN DURATION TO THE DURATION OF THIS WARRANTY.

Some states do not allow the exclusion or limitation of incidental or consequential damages, or allow limitations on how long an implied warranty lasts, so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Note: Thern, Inc. reserves the right to change the design or discontinue the production of any product without prior notice.

About This Manual

The Occupational Safety and Health Act of 1970 states that it is the employer's responsibility to provide a workplace free of hazard. To this end, all equipment should be installed, operated, and maintained in compliance with applicable trade, industrial, federal, state, and local regulations. It is the equipment owner's responsibility to obtain copies of these regulations and to determine the suitability of the equipment to its intended use.

This Owner's Manual, and warning labels attached to the equipment, are to serve as guidelines for hazard-free installation, operation, and maintenance. They should not be understood to prepare you for every possible situation.

The information contained in this manual is applicable only to the Thern Model M4411PB Spur Gear Hand Winches. Do not use this manual as a source of information for any other equipment.

The following symbols are used for emphasis throughout this manual:

⚠WARNING

Failure to follow 'WARNING!' instructions may result in equipment damage, property damage, and/or serious personal injury.

⚠CAUTION

Failure to follow 'CAUTION!' instructions may result in equipment damage, property damage, and/or minor personal injury.

Important!

Failure to follow 'important!' instructions may result in poor performance of the equipment.

Suggestions for Safe Operation

A5359B-0799

⚠WARNING

DO the following:

Read and comply with the guidelines set forth in this Owner's Manual. Keep this manual, and all labels attached to the winch, readable and with the equipment at all times. Contact Thern, Inc. for replacements.

Check lubrication before use.

Install the wire rope securely to the winch drum.

Keep at least 4 wraps of wire rope wound on the drum at all times, to serve as anchor wraps. Failure to do so could cause the load to fall.

Keep hands away from the drum, gears, wire rope, and other moving parts of the equipment.

DO NOT do the following:

Do not lift people, or things over people. Do not walk or work under a load or in the line of force of any load.

Do not exceed the load rating of the winch or any other component in the system.

Do not use more than one winch to move a load that exceeds the load rating of a single winch. A shift in load weight could overload the equipment.

Do not use damaged or malfunctioning equipment. To do so could result in failure of the equipment.

Do not modify the equipment in any way. To do so could cause equipment failure.

Do not wrap the wire rope around the load. This damages the wire rope and could cause the load to fall. Use a sling or other approved lifting device.

Do not operate the winch with guards removed or improperly installed.

Do not divert your attention from the operation. Stay alert to the possibility of accidents, and try to prevent them from happening.

Do not jerk or swing the load. Avoid shock loads by starting and stopping the load smoothly. Shock loads overload the equipment and may cause damage.

Do not lift loads or pull loads on an incline unless the winch is equipped with a brake.

Do not leave a suspended load unattended. Place the load on the ground if it must be left unattended.

1.1 Installing the Winch

Important!

- Inspect the winch immediately following installation according to the Instructions for Periodic Inspection. This will give you a record of the condition of the winch with which to compare future inspections.
- A qualified professional should inspect or design the foundation to insure that it will provide adequate support.
- Locate the winch so it will be visible during the entire operation.

⚠WARNING

Do not install the winch in an area defined as hazardous by the National Electric Code, unless installation in such an area has been thoroughly approved.

Do not install the winch near corrosive chemicals, flammable materials, explosives, or other elements that may damage the winch or injure the operator. Adequately protect the winch and the operator from such elements.

Position the winch so the operator can stand clear of the load, and out of the path of a broken wire rope that could snap back and cause injury.

Attach the winch to a rigid and level foundation that will support the winch and its load under all load conditions, including shock loading.

1.1.1 CONSULT APPLICABLE CODES AND REGULATIONS for specific rules on installing the equipment.

1.1.2 LOCATE THE WINCH in an area clear of traffic and obstacles that could interfere with operation. Make sure the winch is accessible for maintenance and operation.

1.1.3 MAINTAIN A FLEET ANGLE between 1/2 and 1-1/2 degrees. The proper fleet angle minimizes wire rope damage by helping the wire rope wind uniformly onto the drum. See figure 1.

1.1.4 FASTEN THE WINCH securely to the foundation.

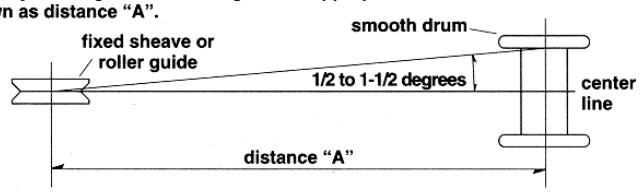
CONTACT A QUALIFIED PROFESSIONAL FOR MOUNTING INSTRUCTIONS TO COMPLY WITH LOCAL CODES.

Important!

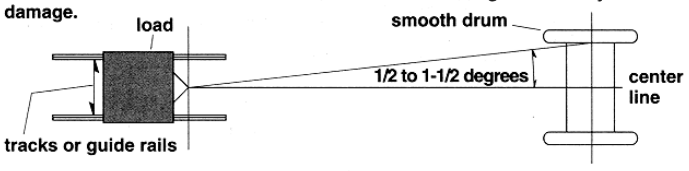
- Use a sheave or roller guide to direct the wire rope to the drum whenever possible.
- Install sheaves, tracks and other equipment so they will remain fixed under all load conditions. Follow the recommendations of the equipment manufacturer.
- Use sheaves of proper diameter to minimize wear on the wire rope. Follow the recommendations of the sheave manufacturer.

Figure 1 – Maintaining the Fleet Angle

- **When wire rope travels over a sheave or through a roller guide – maintain fleet angle by locating the sheave or guide an appropriate distance from the drum, shown as distance "A".**



- **When wire rope travels directly to the load – maintain fleet angle by controlling side-to-side movement of the load with tracks or guide rails. Allowing the load to move too far to one side causes stress on the drum flange which may cause damage.**



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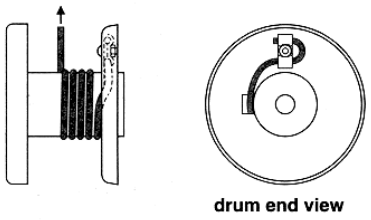
1.2 Installing the Wire Rope

Important!

- Use wire rope and other rigging equipment rated for the size of the largest load you will be moving.
- Do not drag the wire rope through dirt or debris that could cause damage, or poor operation.
- Always wear protective clothing when handling wire rope.

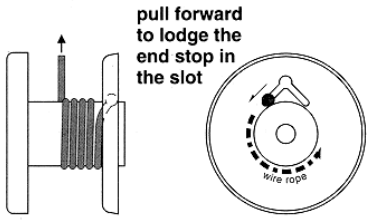
Figure 2 – Flange Clip Anchor



drum end view

typical installation shown
right lay – underwound

Figure 3 – Quick Disconnect Anchor



drum end view

typical installation shown
right lay – underwound

⚠WARNING

Install the wire rope so it is wound correctly as shown, or the winch will not work properly, and the load could fall.

Install the wire rope securely to the winch drum. A poorly secured wire rope could come loose from its anchor and allow the load to fall.

1.2.1 PURCHASE THE PROPER WIRE ROPE for your application. Keep the following in mind when selecting a wire rope. Contact a reputable wire rope supplier for help.

a BREAKING STRENGTH of new wire rope should be at least 3 times greater than the largest load placed on the winch. If loads are lifted or pulled on an incline, the breaking strength must be at least 5 times greater than the largest load. These are minimum values and will vary with the type of load and how you are moving it.

b WIRE ROPE LAY must agree with the winding direction of the drum to help insure proper winding.

c WE RECOMMEND 7 x 19 galvanized aircraft cable for diameters up to 5/16 inch.

1.2.2 INSTALL THE HANDLE by loosening the set screw and assembling the handle and socket to the hex drive. Secure in place by tightening the set screw.

1.2.3 ANCHOR THE WIRE ROPE to the drum using either the flange clip or quick disconnect anchor.

a FLANGE CLIP ANCHOR. See figure 2.

- PASS THE END OF THE WIRE ROPE through the hole in the flange.
- INSERT THE CARRIAGE BOLT, loop the wire rope around the bolt, and install the clip so the wire rope is held by the curves of the clip.
- INSTALL THE JAM NUT and tighten it until the wire rope is flattened against the drum flange.

b QUICK DISCONNECT ANCHOR. See figure 3.

- PUSH THE END STOP through the large center hole in the drum flange.
- PULL THE WIRE ROPE forward to lodge the end stop in the slot.

1.2.4 TURN THE HANDLE CLOCKWISE to wind wire rope onto the drum. If wire rope unwinds from the drum when the handle is rotated clockwise, the wire rope is installed incorrectly. **Install the wire rope correctly before continuing.**

1.2.5 WIND FOUR FULL WRAPS of wire rope onto the drum by operating the winch while holding the wire rope taught. **These wraps serve as anchor wraps and must remain on the drum at all times.**

A5359B-0799

2.1 General Theory of Operation

Important!

- Limit nonuniform winding by keeping tension on the wire rope and by maintaining the proper fleet angle.
- It is your responsibility to detect and account for different factors affecting the condition and performance of the equipment.

2.1.1 THE PULL REQUIRED to move the load must not exceed the load rating of the winch. Consider the total force required to move the load, not the weight of the load.

2.1.2 THIS EQUIPMENT CAN develop forces that will exceed the load rating. It is the responsibility of the equipment user to limit the size of the load. Inspect the equipment regularly for damage according to the instructions contained in this manual.

2.1.3 USE A DISC BRAKE on all hand winches used to lift loads or pull loads on an incline.

2.1.4 PERFORMANCE RATINGS of the equipment are affected by the amount of wire rope wound on the drum, the way in which it is wound, and the way the winch is used.

a DRUM CAPACITY depends on how tightly and evenly the wire rope is wound on the drum. Actual drum capacities are usually 25-30% less than values shown in performance tables, due to loose winding and overlapping.

b FORCE REQUIRED TO LIFT the load increases with each additional layer of wire rope wound onto the drum. The value shown in performance tables is based on an empty drum.

c LOAD RATING represents the maximum pull that can be placed on new equipment. Load ratings are assigned values for specific amounts of load travel or wire rope accumulation. The load rating decreases as layers of wire rope accumulate on the drum.

2.1.5 DUTY RATINGS refer to the type of use the equipment is subject to. Consider the following when determining duty rating.

a ENVIRONMENT: harsh environments include hot, cold, dirty, wet, corrosive, or explosive surroundings. **Protect the equipment from harsh environments when possible.**

b MAINTENANCE: poor maintenance, meaning poor cleaning, lubrication, or inspection, leads to poor operation and possible damage of the equipment. **Minimize poor maintenance by carefully following the instructions contained in this manual.**

c LOADING: severe loading includes shock loading and moving loads that exceed the load rating of the equipment. **Avoid shock loads, and do not exceed the load rating of the equipment.**

d FREQUENCY OF OPERATION: frequent or lengthy operations increase wear and shorten the life span of gears, bearings, and other components. **Increase maintenance of the equipment if used in frequent operations.**

CONTACT THE FACTORY FOR MORE INFORMATION.

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2.2 Suggestions for Safe Operation

⚠WARNING

DO the following:

Keep at least 4 wraps of wire rope wound on the drum at all times, to serve as anchor wraps. With less than 4 wraps on the drum the wire rope could come loose, causing the load to fall.

Keep hands away from the drum, gears, wire rope, and other moving parts of the equipment.

Keep all people, including operators and yourself, away from the winch. Keep out of the path of the load, and out of the path of a broken wire rope that might snap back and cause injury.

DO NOT do the following:

Do not lift people, or things over people. Do not walk or work under a load or in the line of force of any load.

Do not exceed the load rating of the winch or any other component in the system. To do so could result in failure of the equipment.

Do not use more than one winch to move a load that exceeds the load rating of a single winch. A shift in load weight could overload the equipment.

Do not use damaged or malfunctioning equipment. To do so could result in failure of the equipment.

Do not modify the equipment in any way. To do so could cause equipment failure.

Do not operate the winch with guards removed or improperly installed.

Do not divert your attention from the operation. Stay alert to the possibility of accidents, and try to prevent them from happening.

Do not jerk or swing the load. Avoid shock loads by starting and stopping the load smoothly. Shock loads overload the equipment and may cause damage.

Do not lift loads or pull loads on an incline unless the winch is equipped with a brake.

Do not leave a suspended load unattended. Place the load on the ground before leaving it unattended.

2.3 Breaking-In the Winch

2.3.1 BREAK-IN OCCURS during the first 10 hours of normal operation. During break-in, mating surfaces become polished, and clearances increase. This is desired for efficient operation of bearings and gears.

2.3.2 INSPECT THE WINCH following break-in according to the Instructions for Periodic Inspection.

2.4 Preparing for Operation

Important!

- When determining whether the load will exceed the load rating, consider the total force required to move the load.

2.4.1 CONSIDER THE OPERATION. Do not begin until you are sure you can perform the entire operation without hazard.

2.4.2 INSPECT ALL COMPONENTS of the system.

a INSPECT THE WINCH and other equipment according to the Instructions for Frequent Inspection.

b OPERATORS must be in good health, alert, thoroughly trained in operating the equipment, and properly clothed (hard hat, safety shoes and safety glasses, no loose clothing).

c THE LOAD must be clear of other objects and free to move. Make sure the load will not tip, spin, roll away, or in any way move uncontrollably.

2.4.3 KNOW YOUR LOAD and make sure you do not exceed the load rating of the winch or any other equipment in the system.

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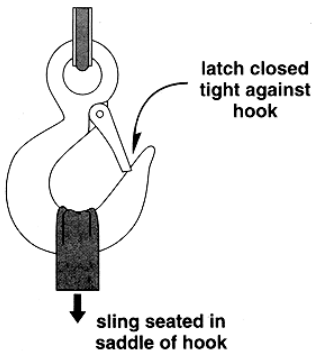
2.5 Attaching the Load

Figure 4 – Attaching Load



⚠WARNING

Do not wrap the wire rope around the load. This damages the wire rope and could cause the load to fall. Use a sling or other approved lifting device.

2.5.1 CLEAR OBJECTS from the path of the load so you can move it freely and observe it at all times during the operation.

2.5.2 ATTACH THE LOAD using a nylon sling, or other approved lifting device. Follow the recommendations of the sling manufacturer.

a SEAT THE SLING in the saddle of the hook with the hook latch completely closed. See figure 4.

b CENTER THE LOAD on the hook so it will remain balanced and not tip or rotate to one side.

2.6 Moving the Load

Important!

- Obey a stop signal from anyone.
- Maintain tension on the wire rope to keep it tightly and evenly wound on the drum.
- If the winch and load are not visible during the entire operation, get help from another person.
- Appoint a supervisor if more than one person is involved in the operation. This will reduce confusion and increase safety.
- When lifting a load, use a tag line to keep the load from swinging or twisting, while keeping yourself away from the load.
- Remove the winch handle when the winch is not in use, to help avoid unauthorized use.

2.6.1 MOVE THE LOAD slowly and smoothly, only a small distance at first. Make sure the load is balanced and securely attached before continuing.

2.6.2 TURN THE HANDLE CLOCKWISE to wind wire rope onto the drum. If wire rope unwinds from the drum when the handle is rotated clockwise, the wire rope is installed incorrectly. **Install the wire rope correctly before continuing.**

2.6.3 OBSERVE THE WIRE ROPE as it winds onto the drum. If it becomes loose, uneven, or overlapped, stop the operation and rewind the wire rope before continuing. **Continued operation with overlapped or uneven wire rope can damage the wire rope and shorten its life.**

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3.1 Cleaning the Winch

Important!

Increase the frequency of maintenance procedures if the winch is:

- Operated for long periods.
- Used to pull heavy loads.
- Operated in wet, dirty, hot, or cold surroundings.

Clean the winch to remove dirt and help prevent rust and corrosion.

3.1.1 CLEAN THE WINCH every six months or whenever it is dirty.

a WIPE ALL EQUIPMENT with an oily rag to remove dirt and grease.

b LEAVE A LIGHT FILM of oil on all surfaces to protect them against rust and corrosion.

c WIPE OFF excessive amounts of oil to avoid the accumulation of dirt.

3.1.2 REMOVE ALL UNNECESSARY OBJECTS from the area surrounding the winch.

3.2 Lubricating the Winch

Important!

- Make sure lubricant has a temperature rating appropriate for the ambient temperatures of the operation.

⚠CAUTION

Do not over lubricate the brake bushings. Over lubricating may cause oil to leak onto the friction discs, which may damage the friction discs or result in poor operation of the disc brake.

Lubricate the spur gears before each operation, and periodically during operation. Failure to lubricate the gears will cause damage or deformation of gear teeth.

Lubricate the winch properly to help protect it from wear and rust. Read the following instructions carefully.

3.2.1 CONSULT MANUFACTURER'S RECOMMENDATIONS for specific information on lubricating the wire rope and other equipment.

3.2.2 LUBRICATE WINCH BEARINGS AND SHAFTS at least every 6 months.

a APPLY 2 TO 3 DROPS of SAE 30 non-detergent oil to bearings and shafts at all friction points.

b ROTATE THE DRUM several times to allow the oil to penetrate, and wipe off excess oil to avoid accumulation of dirt.

3.2.3 LUBRICATE WINCH GEARS before every operation and at least every 10 hours during operation.

a APPLY A LIGHT FILM of open gear lubricant to the gear teeth on all gears.

b USE SPRAYON 201 or equivalent open gear lube. For dirty conditions use a dry lubricant such as dry graphite or Moly.

3.2.4 LUBRICATE THE DISC BRAKE at least every 6 months. Place 1 or 2 drops of SAE 30 non-detergent oil into the hole in the brake housing marked "oil", and turn the brake several times to allow the oil to penetrate.

3.2.5 LUBRICATE THE WIRE ROPE by following the wire rope manufacturer's recommendations.

3.3 Inspecting the Equipment

Important!

- Start an inspection program as soon as you put the winch into use.
- Appoint a qualified person to be responsible for regularly inspecting the equipment.
- Keep written records of inspection. This allows comparison with comments from previous inspections so you can see changes in condition or performance.

Perform frequent inspections:

- Before each operation.
- Every 3 hours during operation.
- Whenever you notice signs of damage or poor operation.

⚠WARNING

Do not use damaged or malfunctioning equipment. Place an "OUT OF ORDER" sign on the winch. Do not use the winch until the sign is removed by a qualified maintenance person who has completely corrected the problem.

Inspect the winch to detect signs of damage or poor operation before they become hazardous.

3.3.1 CONSULT APPLICABLE CODES AND REGULATIONS for specific rules on inspecting the winch and other equipment.

3.3.2 CONSULT MANUFACTURER'S RECOMMENDATIONS for information on inspecting the wire rope and other equipment.

3.3.3 **Instructions for Frequent Inspection**

a VISUALLY INSPECT the entire winch and all other equipment involved in the operation.

- Check all equipment for cracks, dents, bending, rust, wear, corrosion and other damage.
- Make sure the wire rope is installed correctly and anchored securely to the drum.
- Make sure the winch and brake are properly lubricated.
- Make sure the set screw holding the handle in place is tight.
- Make sure mounting fasteners are tightened securely.
- Make sure the foundation is in good condition, and capable of supporting the winch and its load under all load conditions.

b TEST WINCH PERFORMANCE by moving a test load of 100 pounds.

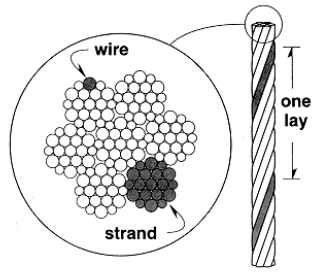
- Listen for unusual noises, and look for signs of damage as you operate the winch.
- Make sure the wire rope winds evenly and tightly onto the drum. If it is loose or uneven, rewind it before continuing.
- Make sure the handle rotates freely in both directions.
- Make sure the disc brake ratchet pawl clicks firmly as the brake handle is turned clockwise.
- Check the brake. Raise the load, then lower it and stop it a few feet off the ground. If the load continues to coast or creep, the friction discs may be worn and in need of replacement.

Completely correct all problems before continuing. Use the Troubleshooting Chart to help determine the cause of certain problems. See table 2.

Perform periodic inspections:

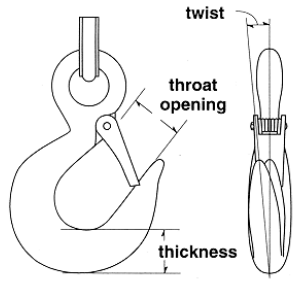
- Every 6 months.
- Whenever you return the winch to service from storage.
- Whenever you notice damage or poor operation in a frequent inspection.
- Whenever you have, or think you may have, overloaded or shock loaded the winch.

Figure 5 – Broken Wires



Wire rope assembly must be replaced if more than 6 wires are broken in one lay, or if more than 3 wires are broken in one strand in one lay.

Figure 6 – Load Hook Inspection



The wire rope assembly must be replaced if the throat opening is 15% wider than nominal, if the thickness is 10% less than nominal, or if the hook is twisted 10° or more.

3.3.4 **Instructions for Periodic Inspection**

a VISUALLY INSPECT the winch and all other equipment.

- Check the finish for wear, flaking, or other damage.
- Check all equipment for cracks, dents, bending, rust, wear, corrosion and other damage. If the winch was overloaded, or if you notice cracks and other signs of overloading, check for damage using magnetic or chemical crack detecting procedures.
- Check all fasteners for stripped threads, wear, bending, and other damage.
- Check the foundation for cracks, corrosion, and other damage.
- Make sure the winch and brake are properly lubricated.
- Make sure all labels and plates are readable, firmly attached, free of damage and clean. Replacements are available from the factory.

b REMOVE THE WIRE ROPE entirely from the drum.

- Always wear protective clothing when handling wire rope.
- Check the entire length of wire rope for bent wires, crushed areas, broken or cut wires, corrosion, and other damage. Carefully inspect areas that pass over sheaves or through roller guides.
- Note the location and concentration of broken wires. Replace wire rope if more than 6 wires are broken in one lay, or more than 3 wires are broken in one strand in one lay. See figure 5.
- Make sure the load hook or other device is securely attached to the wire rope, and the wire rope where it is attached is not frayed, corroded, broken, or otherwise damaged.
- Measure the throat opening, thickness, and twist of the hook. Replace the hook if it shows signs of damage. See figure 6.
- Make sure hook latch opens without binding and closes when released.
- Check the anchor holes in the drum flange for signs of wear or distortion.

c PLACE 100 POUNDS of tension on the wire rope.

- Measure the diameter of the wire rope, especially in areas where wear is noticeable. Replace the wire rope if the diameter measures below the minimum diameter at any point. See figure 7.

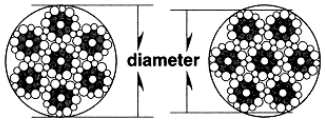
d REMOVE THE WINCH from the foundation.

- Check fasteners for stripped threads, wear, bends, and other damage.
- Check the frame for bending, distortion, cracks and other damage. A bent frame is caused by overloading, and is a sign that your application may require a winch with a larger load rating.

e MOVE THE DRUM with your hands.

- Check for excessive movement indicating worn or loose gears, bearings, or shafts.
- Disassemble the winch and brake if necessary. Inspect gears, bearings, spring pins, and shafts for wear, corrosion, distortion, and other damage.

Figure 7 – Rope Diameter



correct incorrect

The wire rope assembly must be replaced if the diameter measures less than the minimum diameter at any point.

wire rope diameter	minimum diameter
1/8 in	7/64 in (.1094 in)
3/16 in	11/64 in (.1719 in)
1/4 in	15/64 in (.2344 in)
5/16 in	19/64 in (.2969 in)

f FASTEN THE WINCH securely to the foundation.

g INSTALL THE WIRE ROPE.

h TEST WINCH PERFORMANCE by operating the winch with a test load equal to the load rating.

- Listen for unusual noises, and look for signs of damage as you operate the winch.
- Make sure the wire rope winds evenly and tightly onto the drum. If it is loose or uneven, rewind it before continuing.
- Observe the rotating drum, look for signs of loose or misaligned bearings.
- Make sure the handle rotates freely in both directions.
- Make sure the disc brake ratchet pawl clicks firmly as the brake handle is turned clockwise.
- Check the brake. Raise the load, then lower it and stop it a few feet off the ground. If the load continues to coast or creep, the friction discs may be worn and in need of replacement.

Completely correct all problems before continuing. Use the troubleshooting chart to help determine the cause of certain problems. See table 2.

Table 1 – Inspection Checklist

checked boxes indicate damage or problem in need of repair

	damages	problems
general	☐ finish weathered, flaking, otherwise damaged ☐ parts cracked, bent, rusted, worn, otherwise damaged	☐ winch jerks or hesitates during operation ☐ unusual noises, other signs of malfunction
fasteners	☐ stripped threads, bent, worn, otherwise damaged	☐ loose, not tightened to proper torque
gears	☐ excessively worn, cracked, corroded, otherwise damaged	☐ loose or improperly lubricated
brake assembly	☐ brake corroded, cracked, worn, otherwise damaged	☐ brake does not operate properly
drum	☐ anchor hole worn, distorted, otherwise damaged	☐ excessive movement or backlash
wire rope	☐ bent, crushed, otherwise damaged ☐ broken wires, see figure 5 replace if more than 6 wires in one lay, or 3 wires in one strand in one lay, are broken ☐ diameter reduced, see figure 7 replace if diameter is excessively worn	☐ wire rope loosely or unevenly wound number per strand = number per lay = diameter =
end connections	☐ corroded, rusted, worn, otherwise damaged	☐ not securely attached
hook or other device	☐ twisted, bent, worn, otherwise damaged, see figure 6 replace if twist is 10 degrees or more replace if throat width is 15% larger than nominal replace if thickness is 10% less than nominal	☐ hook latch fails to close when released twist = throat width = thickness =
labels and plates	☐ dirty, illegible, otherwise damaged	☐ loosely attached or missing

comments _____

_____

_____

_____

authorized signature _____ **date** _____

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3.4 Repairing the Winch

Important!

- It is your responsibility to determine when to replace parts. When considering whether to continue using a part or to replace it, remember that replacing it is the best way to avoid further equipment damage.
- Replace all spring pins and retaining rings when you disassemble the winch or brake for repair or replacement.
- Appoint a qualified person to be responsible for all repairs to the equipment.

3.4.1 GET FACTORY AUTHORIZATION for all repairs. Unauthorized repairs will void the warranty, and may lead to damage or failure of the winch.

3.4.2 REPLACE DAMAGED OR POORLY OPERATING PARTS with Thern repair parts.

3.4.3 REFINISH AREAS where the paint is worn or flaking. A good finish helps to protect against corrosion and weather damage.

a REMOVE THE FINISH from damaged areas, down to the bare metal.

b CLEAN THE AREA thoroughly.

c REPAINT with a high quality primer and finishing coat.

3.4.4 TO ORDER REPAIR PARTS, contact your local dealer. Include the following information when ordering:

- model number
- serial number (or code number)
- part number
- date purchased, and from whom
- description of what happened, or what is wrong
- your name and return address

Owner's Manual for Thern Model M441PB Spur Gear Hand Winch

TABLE 2— TROUBLESHOOTING CHART

Problem	Cause	Correction
Handle turns, drum doesn't turn	●loose or broken spring pins	..inspect winch and brake, repair as necessary
	●loose, stripped or broken gears	.inspect gears and repair as necessary
Handle turns hard or not at all	●ratchet on winch engaged	.disengage winch ratchet
	●load too heavy	..lighten load
	●spring pins loose or broken on winch or brake	..inspect winch and brake, repair as necessary
	●disc brake damaged or locked	..inspect brake, repair as necessary
	●gears or bearings broken or locked	.inspect and repair as necessary
Brake does not operate properly	●friction discs worn or damaged	.inspect and replace as necessary
	●friction discs damaged from over lubrication	.inspect and replace as necessary
	●disc brake ratchet pawl damaged	.inspect and repair as necessary
Excessively worn gears or bearings (excessive backlash)	●load too heavy	..lighten load
	●poor lubrication of gears or bearings	.inspect and relubricate as necessary
Overheating	●operated too long without rest	..allow to cool
	●load too heavy	...lighten load
	●poor lubrication	.inspect and lubricate as necessary
	●bearing seized up	..inspect and replace as necessary
Unusual noises		
high pitched squeak	●poor lubrication	.inspect and relubricate as necessary
grinding noise	●contaminated lubrication	...clean and relubricate winch
	●dirt in brake or winch gears	...inspect and clean as necessary
	●broken gears or bearings	.inspect and replace as necessary
rattling noise	●loose bolts, set screws or other fasteners	.tighten all bolts and other fasteners
uneven clicking noise in brake	●broken gear tooth in brake	..inspect and repair as necessary
weak clicking noise in brake	●spring or ratchet pawl dirty or damaged	.inspect and clean or repair as necessary
	●worn brake ratchet pawl, gear, or spring	.inspect and replace as necessary
no clicking noise in brake	●ratchet incorrectly installed	...disassemble and install correctly
	●ratchet pawl damaged or worn excessively	.inspect and replace as necessary

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4.1 Transporting the Winch

Important!

- Keep a record of what you ship, and when you send it.

4.1.1 PACK THE WINCH using the original packaging materials, if possible.

4.1.2 SEAL THE WINCH in plastic with a desiccant to help protect it from rust, corrosion, and other damage.

4.1.3 INSPECT THE WINCH according to the Instructions for Periodic Inspection before installing it in a new location.

4.2 Storing the Winch

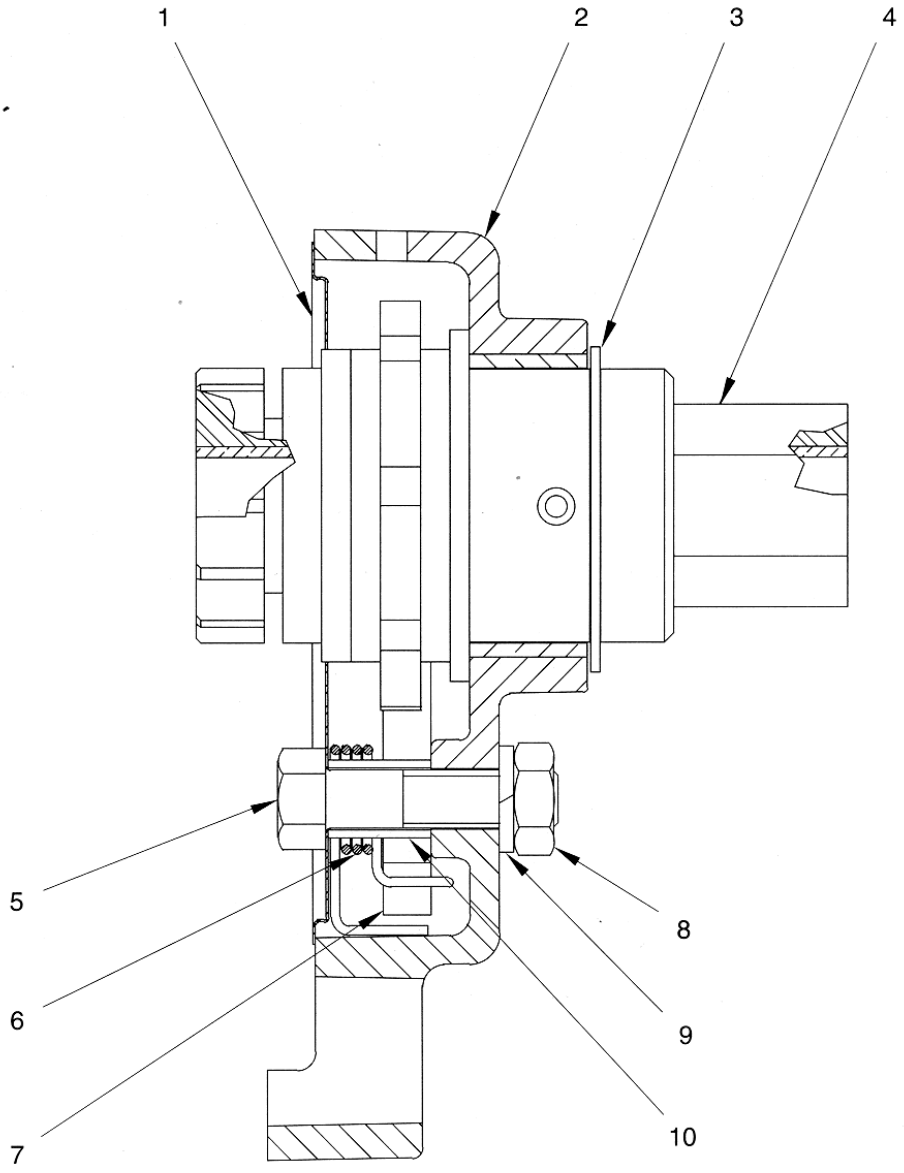
4.2.1 SEAL THE WINCH in plastic with a desiccant to help protect it from rust, corrosion, and other damage.

4.2.2 STORE THE WINCH in a cool clean place away from corrosive chemicals and moisture.

4.2.3 ROTATE THE DRUM periodically to keep bearing and gear surfaces from becoming lacquered.

4.2.4 INSPECT THE WINCH according to the Instructions for Periodic Inspection before installing it for operation.

Parts List for Disc Brake Assembly			
item	description	part number	qty.
1	Brake Cover	A1105	1
2	Bearing Housing Assembly	C2678	1
3	Retaining Ring 1.750 SST	A3883	1
4	Drive Assembly	SB3898	1
5	Capscrew Hexhd .375-16NC x 1.500 SST	A3884	1
6	Torsion Spring SST	A1842	1
7	Ratchet Pawl	A1103	1
8	Hex Jam Nut .375-16NC SST	A3330	1
9	Lock Washer HelSpr .375 x .683 x .094 SST	A3357	1
10	Spacer.391 x .500 x .675	A1104	1



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Model M4411PB Spur Gear Hand Winch			
item	**description**	**part number**	**qty.**
1	Drum Assembly	C1564	1
2	Drum Shaft	C1558	1
3	Drum Gear Guard	B1067	1
4	Countershaft Gear Guard	B1021	1
5	Countershaft Assembly	B2387	1
6	Left Frame Plate	C1034	1
7	Right Frame Plate	C1033	1
8	Radial Ball Bearing .750ID x 1.750OD x .60W	A1256	1
9	Retaining Ring .750 SST	A4408	1
10	Hex Jam Nut .750-16NF SST	A3886	2
11 [1]	Handle Socket	B2089	1
12 [1]	Handle Assembly	SB3874	1
13	Hex Nut .250-20NC SST	A3331	1
14	Capscrew Hxhd Nylk .250-20NC x 1.250 SST	A1870	2
15	Slotted Spring Pin .187 x .750 SST	A4282	1
16	Spacer .312 x .406 x 1.000 ZNPLIRDI	A2820	2
17	Carriage Bolt .250-20NC x .750 SST	A2846	1
18	Tie Down	A1013	1
19 [1]	Setscrew Sqhd Cuppt .312-18NC x .750 SST	A3885	1
20	Disc Brake Assembly	SC2516	1
21	Frame Rod	A1147	1
22	Hex Jam Nut .375-16NC SST	A3330	2
23	Shakeproof Lock Washer .375 x .692 x .035 SST	A3939	2
24	Machinery Bushing .625 x 14GA SST	A5059	1

[1] Items 11, 12, and 19 are not shown in parts drawing.

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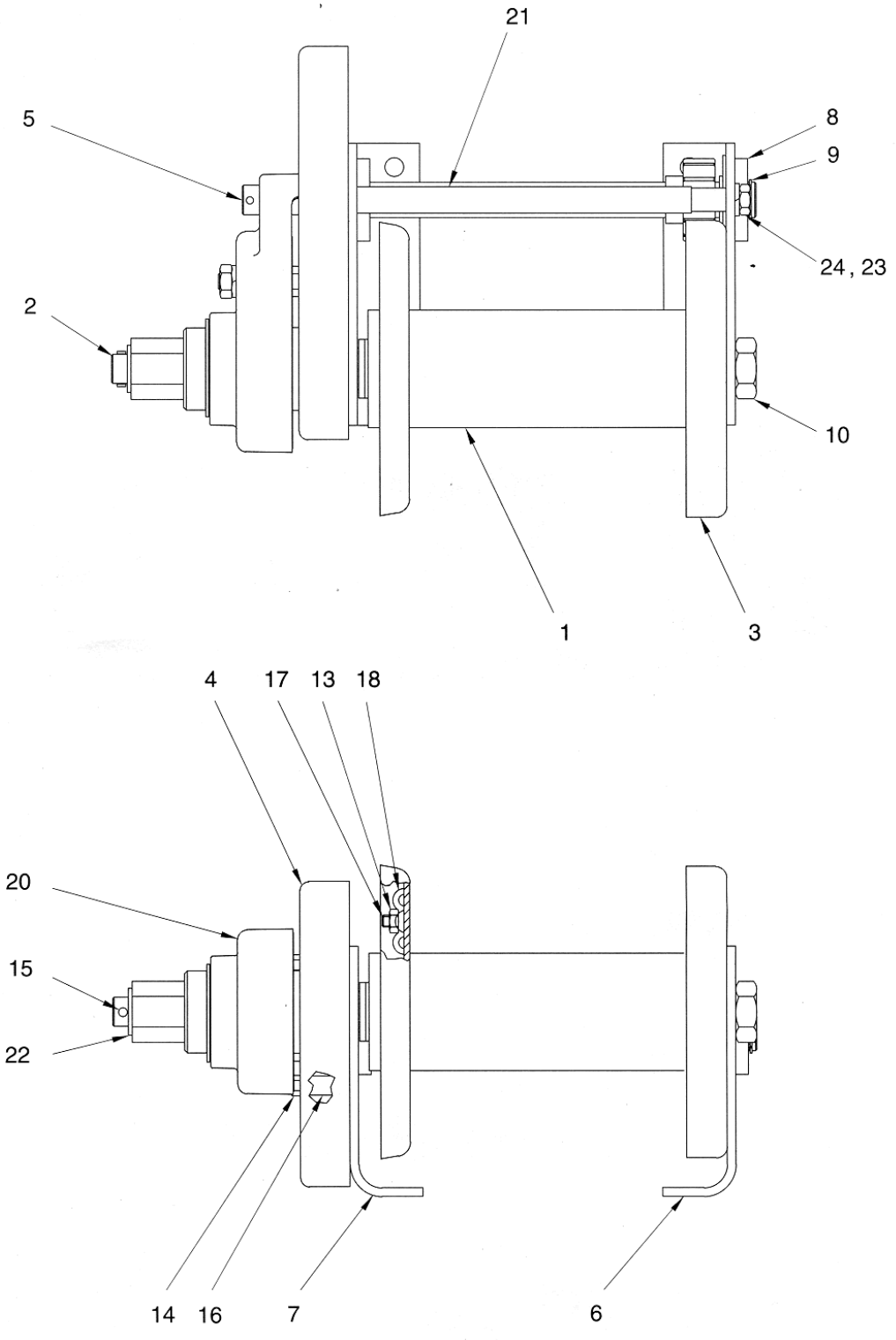

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